MONTHLY BULLETIN

OF THE

INTERNATIONAL RAILWAY CONGRESS ASSOCIATION

(ENGLISH EDITION)

PUBLISHING and EDITORIAL OFFICES : 74, RUE DU PROGRÈS, BRUSSELS.

Yearly prepaid subscription { **Belgium . . . . . 70 Belgas** / **Other countries . . 75 Belgas** } including postage

Price of this single copy : 8 Belgas (not including postage).

(1 Belga = 5 Belgian francs.)

Subscriptions and orders for single copies (January 1931 and later editions) to be addressed to the General Secretary, International Railway Congress Association, 74, rue du Progrès, Brussels (Belgium).

Orders for copies previous to January 1931 should be addressed to Messrs. Weissenbruch & Co. Ltd., Printers, 49, rue du Poinçon, Brussels.

Advertisements : All communications should be addressed to the Association, **74, rue du Progrès, Brussels.**

CONTENTS OF THE NUMBER FOR DECEMBER 1935.

CONTENTS.	Page.
I. **Apparatus for repeating and recording signal indications in locomotive cabs and railcar driving compartments**, by A. MASCINI and G. MINUCCIANI	1399
II. New German **streamlined 4-6-4 type locomotives**	1437
III. **Diesel fuels and their selection**, by H. N. BASSETT	1448
IV. **Statistics of rail breakages** for the years 1933-1934	1455
V. MISCELLANEOUS INFORMATION :	
1. Present **tendencies in electric locomotive construction**	1487
2. **Fuel consumption** on Austrian Railways, by F. STRAUSS	1489
3. **Water-softening plant** on the London & North Eastern Railway. New installations	1492
VI. NEW BOOKS AND PUBLICATIONS :	
Leitfaden für den Dampflokomotiv Dienst (*Manual for the steam locomotive staff*), by L. NIEDERSTRASSER	1494
VII. OBITUARY : **G. Philippe**	1495
VIII. MONTHLY BIBLIOGRAPHY OF RAILWAYS	163
IX. ANALYTIC TABLE OF ARTICLES arranged according to the decimal classification (1935)	1 to 13
X. CONTENTS OF THE 17TH YEAR of the English edition	I to VIII

LIBRARY

OF THE

Permanent Commission of the International Railway Congress Association

READING ROOM : 74, rue du Progrès, Brussels.

Works in connection with railway matters which are presented to the Permanent Commission are mentioned in the « Bulletin ». They are filed and placed in the library. If the Executive Committee deems it advisable, they are made the subject of a special notice. Books and publications placed in the reading room may be consulted by any person in possession of an introduction delivered by a member of the Association. Books, etc., may not be taken away except by special permission of the Executive Committee.

The Permanent Commission of the Association is not responsible for the opinions expressed in the articles published in the Bulletin.

All original articles and papers published in the BULLETIN are copyright, except with the consent of the Authors and the Committee.

Editions in **French** and in **German** are also published.

Vol. XVII. — No. 12. December 1935.

BULLETIN
OF THE
INTERNATIONAL RAILWAY CONGRESS
ASSOCIATION
(ENGLISH EDITION)

[656.254]

Apparatus for repeating and recording signal indications in locomotive cabs or railcar driving compartments [1],

By Dott. Ing. Alessandro MASCINI
and Dott. Ing. Gino MINUCCIANI,
both of the Italian State Railways.

The present article deals with locomotive and railcar cab signal repeating and recording equipment. It shows the great importance of this subject especially from the safe working aspect. The very high speeds of today make it necessary to provide the train drivers with more reliable means of working the trains in bad weather such as dense fog, snow, etc.

It also shows how complicated and difficult the problem has become through the inherent subjections of railway working which has to meet the special needs of the rolling stock or the special conditions of the track. The article stresses the fact that any apparatus designed to solve such a problem must be absolutely reliable so that it cannot give a line clear indication when the signal is at danger.

After a full exposition of the railway problem in its relation to present-day railway signalling practice, the authors point out that an essential property of any apparatus of this kind shall be that every defect or damage to the track or locomotive equipment is revealed automatically. In other words, when everything is in perfect order, and then only, can the repeating device give line clear, that is to say give the indication that the train can be worked without special precaution.

Should anything get out of order, the indication given in the cab should be either « caution » or « stop », to be on the safe side.

A detailed description of the apparatus designed by Mr. Minucciani follows. This equipment has been in use experimentally for a number of years, and is fitted at all distant signals on the Bologna-Milan line and on a good many locomotives working on this line.

The article then considers how far this apparatus ensures safe working and if or under what conditions it may not work perfectly.

The problem in general.

Cab signalling in railway working has been under discussion for many

(1) Paper presented at the third National Congress of the National Fascist Union of Italian Engineers, held at Trieste, 30/31 May-1/2 June 1935. — Translated from the Italian.

years (1). It is considered not merely desirable but indispensable that the men who drive the trains should have an absolutely and continuously effective signalling system even under quite unfavourable weather conditions, such as dense fog, heavy snow, etc.

Under such weather conditions, the sighting of signals becomes quite problematic, especially on fast trains, and its auxiliary, the audible signal, the only possible alternative when the signals cannot be seen clearly, has many defects for which no remedy has been found so far. Detonators, although used on all railways, do not fully meet requirements in some cases where the signals cannot be seen because the detonators have to be put on the rails by men or detonator-placing devices when the signal is at *danger*, and removed when it is at *line clear*. The method is the only means of letting the enginemen know if the train is to stop or proceed, as if the train is to stop the locomotive explodes the detonator. Now the mechanical detonator-placers, operated by the signal should theoretically fulfil the requirements in a perfect manner. In practice they have shown themselves unsatisfactory. They have to be lightly made and this goes against reliability and durability in the difficult conditions under which they work, owing to the exposed position they occupy. This drives us back to the use of men who, however devoted and conscientious, in certain conditions of extremely poor visibility are unable to remove the detonators from the rail when the signal comes *off* or put them on the rails when the signal is put to *danger*. In practice under these conditions the signal is not visible from the position where the detonators should be placed and therefore the signal indication cannot be repeated.

The result is that, for greater safety, the men leave the detonator on the rail even if the signal is taken off, so that the men in the oncoming train hear the detonators explode in all cases, that is to say both when the signal indicates section occupied and unfortunately also when the line is clear.

The result of this state of affairs, which cannot be altered when visibility is poor, is that the detonators are considered not as an audible signal replacing the optical signal, but only as indicating the location, i.e. as a signal which warns the enginemen they are near a signal which should give them optically the indication to proceed or to stop. If the signal cannot be seen, the enginemen cannot know whether to stop or run on; if they prepare for stopping or do stop, the train loses time possibly to a serious extent if the fog is widespread, and if they continue to run the safety of the train may be jeopardised.

This state of affairs, in which the running of the train is left to the judgement of the staff instead of being based on clear and exact orders given to the enginemen by the signals, should not be allowed to persist. Furthermore the various auxiliary appliances so far introduced by different railways through-

---

(1) Investigations into this question have been carried out in all countries for the last thirty years and their results published in the railway press and other technical publications.

It would be next to impossible — and useless — to mention all these publications. The question was also discussed at many congresses dealing with railway matters, and the conclusions come to thereat were always of a general nature.

In 1914, a very complete and precise study based on the data available at the time, was made by Sr. Luigi Velani, who published it in the *Rivista Tecnica delle Ferrovie Italiane*, Nos. 2, 3, 4 and 1, of the 15 February, 15 March, 15 April and 15 July respectively. Considerations and conclusions, of a general nature, remain much the same as twenty years ago, not because the question made no progress during this period, but because at that time the general knowledge in connection with this question was already quite appreciable. Designs, however, were far from perfect, and it is in this field that marked progress is noticed at the present time.

out the world (hooters, whistles, floodlighting the signals, location boards, winking lights, etc.) are in fact less effective than detonators, which latter, in spite of the abovementioned drawbacks, have the incontestable advantage of relying on the sense of hearing, which is not affected by bad weather conditions.

* * *

Under these conditions, the need for apparatus in the locomotive cab which would repeat the signals reliably has made itself felt daily more and more. If we consider the following main factors we come to the same result :

a) the speed of the trains tends to increase to a limit which cannot be foretold, as a result of the development of other modern means of transport (motor cars, aeroplanes) which has forced the railways to modernise their practice if they are not to go out of business.

b) the traffic density, especially as regards the number and frequency of trains over a railway line, for the same reasons tends to increase rapidly.

c) the working conditions indicated above — with the block installations (automatic or non-automatic) required — have made the *signals a factor of growing importance*, so much so that the modern tendency is towards working the trains over a line solely by means of the indications given by the signals.

To obtain this result, *the enginemen must obviously be enabled to obey in all cases the orders given by the signals.*

The ideal method, and one which fully meets the requirements is to repeat *permanently* in the cab the indication of the signals the train is meeting. This has been done in America over a small section of line, but obviously the cost of such an installation can become so high as to make its use on a large scale prohibitive. Although we do not question that this result may be achieved in a practical manner and at reasonable cost, at a later date, especially on electrified lines whereon continuous conductors already exist, at present we can be satisfied with the repetition of the signals in the cab as the locomotive passes them, i.e. an intermittent but sufficiently effective repetition, and one which fulfils the requirements by repeating in the cab the indications of the distant signals, which are located far enough from the home signal for the train to be stopped without overrunning the latter signal.

* * *

It will be as well to say a few words here on the regulations now in force on the Italian State Railways, especially on the main lines over which high speeds (exceeding 90 km. = 56 miles an hour) are authorised.

Each station, or junction or other similar point, is covered by a signal post of the doll type, carrying two or more red semaphore arms (fig. 1) each of which gives the *stop* indication when

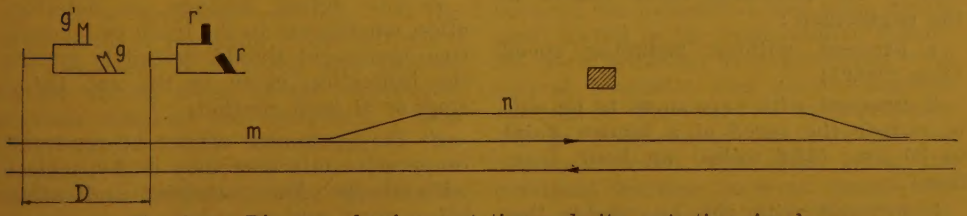


Fig. 1. — Diagram showing a station and its protecting signals.

in the horizontal position. If the top signal arm *r* points downwards the speed need not be checked as the train is running on the through road *m*, whereas if the lower arm *r'* on the bracket points downwards, the train speed must be reduced to 30 km. (18.6 miles) an hour before reaching the first point where it will be turned out onto line *n*. A similar post is provided *not less than the distance D required for stopping the fastest train on the section* before the home signal. The arms *g* and *g'* of this signal — a distant signal — are painted yellow and have fishtail ends and are interlocked with the corresponding home signals so that they can only be pulled off when the home signals are off and remain so.

Special signals (i.e. not fixed) arranged in a similar way are used to protect a point where a train has to reduce speed or stop for some temporary reason (works in progress, obstruction, etc.). In this case too the distant signal is located far enough from the home or reduced speed signal for the train to stop or to reduce its speed before reaching the latter. The signalling on lines over which trains run at lower speeds is simpler but, as will be mentioned later, the repeater can be located so as to ensure the train stopping at the desired point. As cab signalling is of less importance on such lines we will deal with high-speed lines only.

* * *

When the system of signalling is in use, the caution or distant signals can convey the following three orders to the enginemen :

1. proceed without reducing speed (line clear);

2. proceed with care so as to be able to reduce the speed at a known point to 30 km. (18.6 miles) an hour (caution);

3. proceed with the knowledge that the train will have to be stopped before reaching a given point (line occupied).

These therefore are the three signal indications to be *repeated* in the driver's cab. As there must be no difficulty in repeating them not only on steam-operated lines, but also on either direct or alternating-current electrified lines, the railway signalling problem when set in this way can be considered as wholly defined in all its essential factors.

It should be remarked here that all railways have not defined the problem in so complete and rigorous a manner; many have been content to lay down easier conditions. However, in the case of the Italian railways, with their constantly and rapidly changing operating conditions, it would be imprudent to forego any one of the fundamental conditions set forth hereafter, as otherwise it might become necessary to improve at a later date the simpler equipment adopted, or the locomotive stock could not be used so widely as it could not be worked over all parts of the system.

* * *

Within the general limits of the problem, such equipment should guarantee that :

a) when a locomotive passes a signal, the signal indication should always be *positively* transmitted to the engine cab, i.e. a failure must never occur;

b) the *line clear* indication *can only be given* when the line signal is really *off*;

c) any defect, damage, or deterioration whatsoever in the track or locomotive equipment should definitely ensure the indication given in the cab being *stop*, or at least *caution*;

d) the equipment cannot be rendered inoperative mischievously or by neglect without the *line occupied* indication being given and recorded.

In other words, line clear must only be given by the cab signalling equipment when all the parts are in perfect working order; this requirement is an essential one as the *line clear* indication allows the enginemen to proceed without any speed reduction, and any error in the indication therefore would imperil the safety of the train.

Consequently a certain percentage of *uncalled-for line occupied* or *caution* indications must be tolerated, seeing that they are on the side of safety, and are to be obeyed in the case of any defect or deterioration in the track or locomotive equipment. Then too this method of signalling does not interfere with regular running as the driver, seeing the track signal off, will obey this indication and will not reduce speed as he will realise that the cab signalling equipment is out of order.

In practice of course such undesired cab indications must be reduced to as few as possible even if they are not dangerous, as if too frequent the men would lose confidence in the repeating device on which they have to rely in bad weather.

* * *

It is useful to note that *any equipment which complies with the above conditions reveals its own defects automatically and immediately.*

* * *

The above mentioned requirements can be met without any sacrifice of simplicity — which in itself reduces the risk of defective working — if the idea of the « *normally closed circuit* » for line clear is followed and applied in the fullest sense of the expression to each detail of the equipment. This idea implies that everything is so arranged that any defect in any part makes it impossible for the repeater to give the *line clear* indication.

As everyone knows the cab signalling problem has been under consideration on nearly all the important railways of the world for over thirty years and has excited the interest of many inventors not in the railway service. Hundreds of solutions are known, few of which have passed their tests; very few have been widely adopted by important railways and almost none completely meets the conditions laid down above. The problem is complicated and difficult especially in view of the delicate nature of the appliances used which contrast with the unfavourable position in which they are located and are expected to stand up in practice.

* * *

We will now examine briefly and analytically, in the light of experience, the reason for so little success; this may be considered in a sense as the philosophy of cab signalling.

Those who have studied this question know that the gravest difficulty to overcome is that of the locomotive picking up energy — motive power — when passing a given point on the line (a signal). At this moment the energy transmitted from the track to the locomotive should be sufficient to cause a simple movement in some part of the locomotive. Any other movement or force required to operate the audible or optical signals or both can be developed from this movement easily enough, as for example by using a servo-motor.

Mechanical and electrical pick-ups have given trouble with the contacts between the locomotive and track equipment owing to the high relative speeds. No such difficulty is experienced with optical, magnetic and electro-magnetic equipment. The first two types probably will be displaced by the latter two for *obvious* reasons, the chief being the continual increase in train speeds and atmospheric conditions (snow frost,

etc.). Then too the fittings have to project outside the rolling stock or permanent construction gauges or both as otherwise actual contact could not be made.

When making a choice between the two types in the second group, the point to study is with which of the two it is more difficult to interrupt the supply of current and so prevent it being transmitted without loss from the track (signal) to the locomotive when the latter passes the signal.

A ray of light can be blocked out completely by any solid such as snow, tree branches, leaves, etc. or almost completely by heavy fog, snow or hail.

The only way a magnetic field can be cut out, however, is by directing its line of force through a magnetic metal body suitably disposed relatively to the poles. It is difficult therefore to imagine the magnetic field being cut out completely *by chance.*

If the equipment includes several (or many) magnetic fields spaced some distance apart, there is no likelihood of their being all cut out by any *chance occurrence.* The magnetic arrangement therefore appears to be definitely better than the optical. After much experience the tendency today is in this direction, and it is difficult to imagine it being otherwise.

In the case of electric traction, especially when direct current is used, there might be with magnetic equipment some fear of the special inductive field of the equipment being disturbed by the magnetic fields, possibly of high intensity, set up by the currents in the rails. But if this were so this type of apparatus could not be selected, as one of the essential conditions of railway operating would not be complied with.

However, there is no difficulty in proving that by suitably arranging the appliances generating the magnetic fields of the repeater and the corresponding receivers, the magnetic fields set up by the electric currents in the rails can be eliminated, even when the intensity of such currents is very much higher than the usual value. Very carefully checked tests have shown that currents even of 6 000 amperes cause no appreciable disturbance. The reason is given later.

* * *

Once the problem of taking current from the line at the signal has been solved in the best and most reliable manner, the next thing is to select the best method of using this energy, now available on the locomotive, to work all the devices which have to repeat the line signals to the driver and fireman.

Compressed air for operating the brake is available today on all passenger and goods locomotives.

Compressed air is most suitable for operating the optical and acoustical fittings on the locomotive, as with it each part can easily be made to respect the principle of the *normally closed circuit.* All that is required is that the parts are caused to operate by a reduction of the air pressure, following the principle on which the automatic action of the continuous brake depends. Indeed, any drop in pressure through loss of air, whether deliberate or accidental, applies the brakes and acts on the side of safety. In the same way it transmits the signal showing *line occupied,* or at least definitely prevents the *line clear* indication being repeated.

The problem of the application of the automatic compressed-air brake on goods trains has now been solved. Its adoption on the Italian Railways will not be long delayed, many important railways in other countries being already fitted. Compressed air will then have a still more important part to play on the locomotive, as it will have to cover an essential function in which it must never fail, or if it should all the

train and station staff will be made aware of the failure.

Compressed air is therefore not only the natural solution but also the simplest and cheapest and most usual. It does not require any special equipment, neither on steam nor electric locomotives.

* * *

A last preliminary question will be dealt with briefly, the « vigilance » of the men. This is one of principle, as it is directly connected with that of deciding whether it is advisable to fit the locomotives with signal repeating equipment and under what conditions.

When the idea of cab signalling became more general some decades ago, the opinions of competent railway engineers were very divided. Some, and not the least eminent, considered cab signals as objectionable rather than useful. They felt that such a facility would result in the enginemen paying less attention to the signals through too great reliance on the cab signalling equipment. This objection had some weight, especially on railways with staff pyschologically incapable of absolute obedience to orders given by their superiors. The fears of these engineers were somewhat removed on learning that the cab signalling equipment included what was called the « vigilance » device which had to be operated by the driver before reaching the signal, who thereby caused a mark to be made on the speed recorder band and so proved that he had been on the look-out, i.e. had seen the signal before passing it.

We did not mention this question at the beginning of this investigation because the fears of the most timorous had been found little or ill-founded in practice, and because the argument is disproved by facts seeing that many railways have introduced automatic train control on a wide scale, if not on all their locomotives.

In spite of this we thought it desirable to mention the point here because the vigilance device selected in accordance with our requirements would have satisfied the objection of the opponents of the system at the time the objections were raised, or have removed their fears at once. These requirements were that on approaching a signal the driver had to repeat by the vigilance device the signal transmitted i.e. *line clear, caution,* or *stop,* his action being recorded on the speed recorder band. By this means it is possible to check that the driver has not only received the signal but has understood its indication, seeing that he has carried out the prescribed action and this in turn has been recorded.

No better precaution is possible and this vigilance device obviously provides the guarantee that the driver has received and recognised the signal and in a better way than had cab signals not been fitted.

It should be noted that the driver has to carry out this operation as he reaches the signal, as if he does so too soon he runs the risk of being punished. The signal indication might change at the last moment as sometimes happens and the mark on the recorder would then not agree with that automatically recorded on passing the signal.

This operation does not mean, as might be feared, extra work for the driver; he has to make some movement to prove his alertness and can just as easily make one corresponding to the true signal position.

This design would appear to represent a definite advance in the way of perfecting automatic cab signalling equipment.

* * *

Now that the guiding principles of the design of cab signalling have been dealt with, we can briefly examine the conditions this equipment should fulfil.

The Italian State Railways, as long ago as 1918, after having thoroughly investigated the work done throughout the world in this connection, drew up a programme which was published in No. 5, Vol. XIII of the 15th May 1918, of the *Revista Tecnica delle Ferrovie Italiane* under the title : *Condizioni tecniche rechieste delle Ferrovie dello Stato agli apparechi ripetitori dei signali fissi nelle cabini delle locomotive.*

The text of these conditions is reproduced below for the reader's convenience (1).

When these requirements are compared with those considered above, we see that the principles are the same, with the following exceptions :

a) Three indications are provided for instead of two, because progress in signalling has resulted in the use of three-position signals.

b) Instead of only desirable, it is now required that the equipment works equally well with steam traction and with A. C. and D. C. electric traction, in view of the rapid and wide extension of electrification and the resulting necessity for having one type of equipment, so that if required the locomotives

---

(1) *The technical specifications of the Italian State Railways for locomotive cab signalling equipment.*

In 1914, Sr. Luigi VELANI, Engineer, published in the *Rivista* a long article on the technical specifications laid down for cab signalling equipment in other countries, drawn up by the Inspectors of Railways, or by the Technical Unions of the railways in question. This intricate question has been investigated by the Italian State Railways and the following specifications drawn up :

1. The equipment shall repeat the indication of the signals in the cab of the locomotives.

The equipment is neither required nor expected to stop the train automatically.

The repetition shall be visual for *line clear* and *line occupied* positions and for a suitable length of time; it shall be audible for *line occupied* and the audible repetition shall be capable of being interrupted by the driver before the end of its normal period. Each time the equipment acts it must automatically return to the ready position.

2. The apparatus must be so constructed that any defect or failure in any part or connection as well as any doubtful position of the signal shall result in the *stop* indication being given in the cab.

3. The apparatus must work in the open, in tunnels, or on bridge approaches; it must be suitable for both steam and electric (direct-current or three-phase) lines.

4. The apparatus must be readily adaptable to either single or double-track lines; in the second case, only trains on the usual running line need be covered.

It must be suitable for both steam and electric locomotives running in either direction.

5. The apparatus must be built within the construction and rolling stock gauges so that the track equipment cannot be damaged by the rolling stock nor the rolling stock equipment by the track equipment.

6. The apparatus whether mechanical, electrical, or electro-mechanical shall be simple and strongly built and not be affected by weather conditions.

The essential details must be so designed and protected that they are not likely to get out of order.

Contact between the parts on the locomotive and those on the track must be ensured at all speeds. Ordinary movements of the locomotive when running, and wear, whether of the track or the locomotive, must not interfere with the contact.

In the case of mechanical apparatus, the parts which strike one another must be assembled so as to work regularly and to have a long life. The fixed part built into the track and connected to the signal operating gear must not affect the working of the signal nor appreciably add to the effort required to operate the signal.

In the case of electrical equipment, preference will be given to apparatus designed on the normally closed circuit principle.

7. The apparatus need not essentially be recording.

However, designs will be considered which readily enable line clear and line occupied to be recorded preferably on the speed recorder paper when the engines are so fitted, or on suitable paper bands. In this case the travel of the paper should be proportional to the distance run.

There is no objection to the audible signal in the cab being operated by compressed air from the main brake pipe provided, of course, that in using this air the brakes are not applied.

can be run freely over any section of the system.

c) The « vigilance » device has been so improved that there is now not only no fear of the men's attention being distracted from the signals but, on the contrary, it is the greatest guarantee that they have been alert.

d) It has been thought essential to record line occupied should the apparatus be rendered inoperative through neglect or malice because this feature must be incorporated in all safety devices.

The guiding principles, it will be noticed, are widened and made more difficult. The description of the equipment as a whole shows that certain conditions additional to those of the above mentioned official regulations are provided for.

We agree with the Special Commission of the German Railway Union (*Verein*) which, as long ago as 1904, recognised and laid down that such equipment can only be considered useful when it fully and absolutely guarantees the safe running of the train. If not then it must be considered not only useless, but dangerous.

For this reason a switch, to be operated by the driver to bring the equipment into use when the locomotive leaves the shed or when it has to change its direction of running, was not admitted, as if this switch were not operated, harmful effects might result therefrom.

The apparatus should be ready to work as soon as there is sufficient compressed air to work the brake, whatever be the direction of running.

Have these requirements involved excessive complications or expenditure? We think not. However, the work involved in designing the details of the equipment to make sure they meet the general requirements given above was long and laborious.

The equipment has operated over a million times since March 1932, when it was experimentally installed on 33 locomotives on the Bologna-Milan line, with the following results :

1. failure to repeat the signal indication with the apparatus in good order: none;

2. dangerous indications (repeating line clear whereas the signal showed line occupied) : none;

3. undesired indications (repeating line occupied when the signal showed line clear), due to the apparatus: 1.55 %.

The cost of maintenance has not been high. The few parts which gave trouble in practice were always the same so that by suitable changes in design the trouble was overcome.

The equipment could easily be made simpler if less were required of it, but it would seem that savings in the first cost and in the operating costs would hardly justifiy the giving up of having all the signal indications transmitted and recorded, and having the whole guarantee of safe working provided by the equipment described later on. Only a small part of the cost of repairs could be saved, because the parts of the equipment which could be eliminated are not very expensive, and the main part required to guarantee safety must be retained. Then too any partial solution, even if slightly cheaper, should not be adopted as in problems of this kind a complete and radical solution is always the best. The advantages obtained from such a solution always outweigh the slight additional cost incurred.

* * *

Characteristic features of the « Minucciani » cab signalling device.

The cab signalling equipment, designed by Signor Minucciani according to the guiding principles given above, repeats optically and audibly, and records in the locomotive cab, the indications of the distant signals passed by the trains and applying thereto.

These indications, the very same as those of the repeated signals, are the following :

Line clear;

Caution (reduce speed);

Line occupied (stop);

whilst under normal conditions the apparatus gives a constant indication which we call *normal*.

Each time the apparatus operates at each warning signal, i.e. each time the repeater changes from the normal indication to that of the signal to be repeated, the driver has to operate a mechanism to restore the apparatus to the working position; if he fails to do this, whatever the indication of the signal, it is presumed that the driving staff are not on the alert and after some five seconds a warning whistle blows and the brake is applied. It ceases to work if the driver takes the necessary steps, even if he is late in doing so.

The normal indication ceases to be given and cannot be restored if any part of the locomotive equipment is out of order.

The apparatus is completed by what is known as the vigilance device which requires the driver to note, prior to the repeater working, the indication of each signal applying to his train and to take action according to the various indications of the signal, as the diagram records if the driver has been vigilant and has observed the correct signal indication before it is repeated in the locomotive cab.

Generalities.

The apparatus essentially depends upon the magnetic fields set up by the permanent way equipment placed in line with the signals (permanent or electromagnets) and the receivers on the locomotive which under the magnetic action to which they are subjected when passing over the permanent way equipment open the valves and reduce the pressure in the pipes, this reduction in pressure being described later on.

The permanent way magnets are placed within the constructional gauge of the track, and the receivers on the locomotive within the rolling stock gauge; as these two gauges are some distance apart, the said parts when working are separated by 13 to 15 cm. (5 to 6 inches).

The practical working of the system based on magnetic action with powerful fields has become possible thanks to the procedure given later on.

The permanent way equipment is placed exactly in line with the warning signal because the repeater should assist the staff and consequently should act when the staff ceases to observe the signal; then too there must be no disagreement between the signal indication recorded when the driver operated the vigilance device, and that when the locomotive passes the signal, which is equally recorded.

Obviously the cab signalling device can be used with a portable equipment used for a temporary signal protecting permanent way work in hand.

Locomotive equipment.

As has already been said, the locomotive equipment consists of magnetic devices which receive magnetic actions from the track equipment at the signal to be repeated and control the pneumatic apparatus which in turn act on the warning devices, indicators, and recorders, also pneumatically operated.

The whole is completed by the vigilance device, parts of which are common with those of the repeater.

The principal parts of the locomotive equipment are the following (fig. 2) :

Separator and filter;

Magneto-pneumatic receivers;

Combiner;

Optical indicator;

Whistles for audible indications;

Safety valve;

Perforator for recording the signal position and the vigilance of the driver;

Valves for rapidly restoring the perforators to their normal position;

Brake valve and alarm whistle;

Driver's handle for restoring the equipment to normal position and for recording the vigilance of the driver.

In the case of electric locomotives and rail motor cars with two driving compartments, the indicating equipment is duplicated, one set in each cab, and by means of a special valve, the driver can operate the vigilance device from either cab at will.

The whole of the locomotive equipment used to repeat the signal indications operates by reduction of pressure in the case of line clear and line occupied; only the parts of the recording gear, i.e. those which in no way affect safety, are operated by pressure.

In the normal position, only the static pressure of the compressed air is

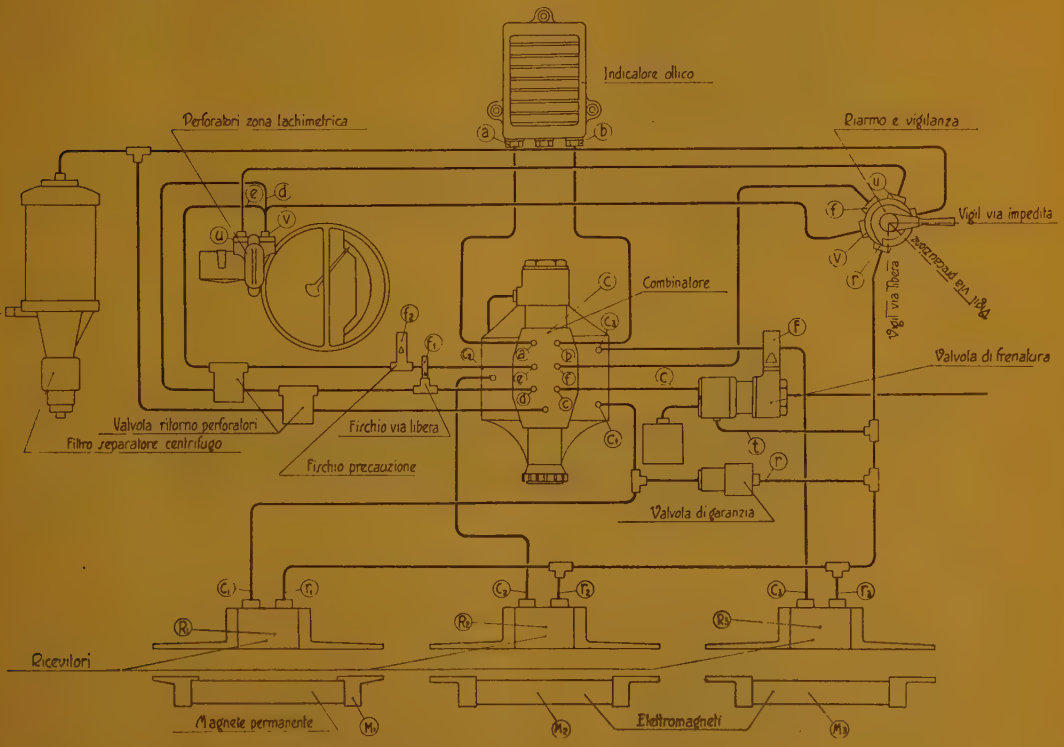


Fig. 2. — The locomotive equipment.

Explanation of Italian terms:

Arrivo-aria = Air inlet. — Perforatori zona tachimetra = Perforators of speed recorder band. — Indicatore ottico = Visual indicator. — Riarmo e vigilanza = Recharging and vigilance checking device. — Vigil. via impedita = Vigilance for « line occupied ». — Coombinatore = Combiner. — Filtro separatore centrifugo = Filter and centrifugal separator. — Valvola ritorno perforatori = Perforator restoring valve. — Fischio via libera = Whistle for « line clear ». — Fischio precauzione = Whistle for « caution ». — Valvola di garanzia = Safety valve. — Valvola de frenatura = Brake valve. — Vigil. via libera = Vigilance for « line clear ». — Vigil. via precauzione = Vigilance for « caution ». — Recivetori = Receivers. — Magnete permanente = Permanent magnets. — Elettromagneti = Electro-magnets.

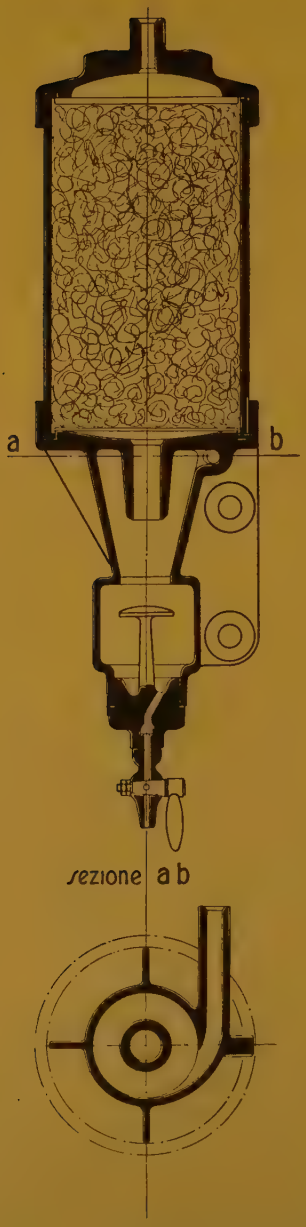


Fig. 3. — Separator and filter.

Note: Sezione = Section

acting, and there is no consumption of compressed air.

Compressed air is only consumed for giving the various indications and for recharging the equipment and this consumption is very small.

Separator and filter.

This apparatus is inserted in the air pipe feeding the repeater and is intended to remove any impurity in the air (fig. 3).

It consists of a lower body designed to separate out the oil which is projected by centrifugal force on the walls and held there; it can be emptied periodically through the bottom drain valve.

The upper part is filled with horse hair which acts as a filter and removes any solid particles.

Magneto-pneumatic receiver.

The magnetic arrangement of a receiver is shown in diagram form in figure 4; the lower part of the diagram shows one of the permanent way electro-magnets.

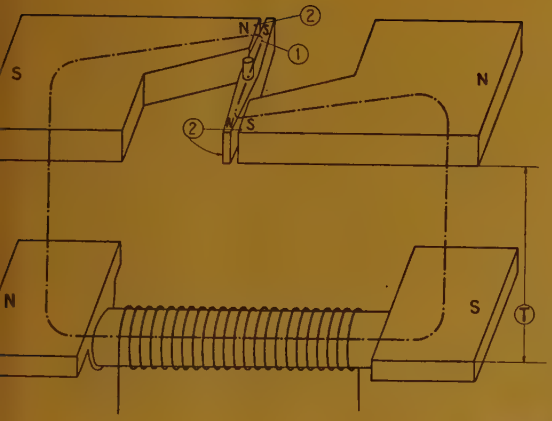
Figure 4 also shows the whole magnetic part of the apparatus when a locomotive passes over it, i.e. at the moment when a receiver on the locomotive is above the corresponding electro-magnet of the permanent way.

The dotted line shows the magnetic circuit and the letters indicate the polarities set up in the different parts.

The part which moves under the magnetic force is the armature 1 which is attracted by poles 2 and turns in the direction of the arrow, overcoming the opposing action of a spring not shown in the drawing.

The means resorted to to make the system practical in spite of the inevitable long gaps T in the electro-magnetic circuit are the following :

a) use of large surfaces (opening out of pole pieces) corresponding to the



wide gaps T of the magnetic circuit, without increasing the weight of the part which must move under the magnetic action;

b) concentration of the magnetic flux in a light armature which, being subjected to strong induction, quickly moves the small amount required to operate the receivers;

c) design of a unit which makes use of the magnetic attraction between neighbouring parts, armature 1 and surfaces 2 facing the armature a short distance from it.

In this connection it is well to remember that the force of magnetic

Fig. 4. — Magnetic part of receiver.

attraction is represented by the following formula (Coulomb's law) :

$$f = R \frac{Q . Q_1}{l^2}$$

in which R is a constant depending upon local conditions,

Q, Q_1 the magnetization of the poles,

l the distance between the poles.

The complete receiver with the pneumatic part is shown in figure 5, and in position in figure 6.

Besides the magnetic part described above, the pneumatic part consists of a pipe 1, a valve 2 which closes this pipe,

a catch 3 which can hold the valve 2 on its seat, and a lever 4 which is caused to bear on the armature 5 moving under the magnetic force. The centre part of the spindle of valve 2 includes the spring 7 (with initial compression), with the object of keeping the valve 2 well on its seat (as long as tooth 3 is engaged), independently of possible slight wear either of the seat or of the valve.

The working is as follows :

Under normal conditions the device is in the position shown in the drawing, with pipe 1 under pressure; when the receiver passes over the magnetic field of the track equipment the armature 5,

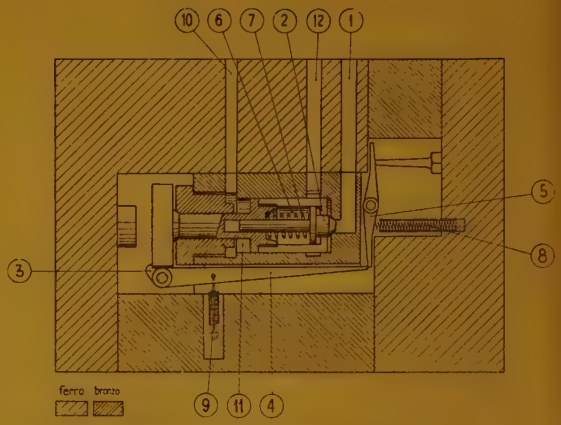


Fig. 5. — Magneto-pneumatic receiver. Diagram and view.

on account of the magnetic force already described, is moved in the direction of the arrow overcoming the force of the opposing spring 8.

Under these conditions, the air pressure in pipe 1 is able to move valve 2 to the left, lever 4 leaving its bearing on the armature 5 and the tooth 3 now becoming disengaged. Pipe 1 which was under pressure then exhausts into the atmosphere through passage 12.

Once this has taken place, valve 2 and pipe 1 are no longer under pressure.

To recharge, all that is needed is to admit compressed air through pipe 10; in this way the pressure built up in chamber 11 moves valve 2 onto its seat, the springs 8 and 9 restore the armature 5 and lever 4 to the position shown on the drawing, and the whole unit is then as shown on the drawing with the exhaust of pipe 1 closed. Pipe 1 is then recharged from the air supply shown later on.

The locomotive equipment comprises three pneumatic receivers of the type described, erected as shown in figure 2, in which R_1, R_2 and R_3 are the three receivers and M_1, M_2 and M_3 the three permanent way magnets.

Fig. 6. — Receiver fitted on locomotive.

Each of these receivers, like the receiver already described, has its air supply pipe c_1, c_2 and c_3 in communication with it, and corresponding to pipe 1 of figure 5.

The pipes c_1, c_2 and c_3, which on one side communicate respectively with receivers R_1, R_2 and R_3, on the other side communicate with the combiner C (fig. 2).

The combiner.

The combiner, by combining the depressions which at each signal take place in pipes c_1, c_2 and c_3, controls the optical and audible indications and the recording corresponding to the position of the signal.

It consists of a body in which the three differential piston assemblies X*x*, Y*y*, and Z*z*, and the differential assembly W*w* cross connected with the former, move (figs. 7 and 8).

The central chamber 5 communicates with the air reservoir of the locomotive and consequently is under constant pressure (6 kgr. per cm² = 85 lb. per sq. inch, for example).

The pipes c_1, c_2 and c_3 communicate with the receivers R_1, R_2, and R_3 respectively as shown in figure 2. Chamber *b* communicates through pipe *t* with three ports respectively closed by the three slide valves r_1, r_2 and r_3 controlled by the piston assemblies X*x*, Y*y* and Z*z* respectively.

Air is able to pass continuously through the small holes 6 from chamber 5, always under pressure, to the chambers a_1, a_2, a_3 and *b* and thence to the pipes c_1, c_2, c_3 and *t*.

If the three receivers R_1, R_2, and R_3 of figure 2 are charged, i.e. under the nor-

mal pressure already indicated, the exhausts from pipes c_1, c_2, c_3 are closed and chambers a_1, a_2 and a_3, through the constant feed, are all building up the same pressure.

The piston assemblies Xx, Yy, and Zz, owing to their diameter and the pressure acting on them take, and remain in, the position shown on the drawing. In this position the three slide valves connected to these pistons close the exhaust from pipe t, and in turn the pistons Ww, under the constant feed and the pressure in chamber b, take up and retain the position shown in the drawing.

If one receiver, R_1 for example, is discharged, pipe c_1 and consequently chamber a are emptied, seeing that the rate of exhaust from the receiver is much greater than the slight constant feed. There is then no longer any pressure on the inside faces of pistons Xx, and owing to the difference in diameter of the pistons on which the pressure acts, the piston assembly Xx moves to the side of the larger piston, i.e. towards the left; the valve r_1, attached thereto, also moves and opens pipe t, i.e. the exhaust from chamber b, and in its turn piston Ww, for reasons similar to those given for the assembly Xx, moves until tooth d_3 bears on the lock of Zz travelling one third of the total stroke and locking the system Zz which has not moved.

If the receiver R_1 is recharged, the pipe c_1 and chamber a_1 again come under pressure and the whole unit again takes up the initial position of the drawing.

The same occurs if either receiver R_2 alone, or receiver R_3 alone, is released or if pipe c_2 alone, or c_3 alone, empties.

If contrariwise, receivers R_1 and R_3 are discharged *simultaneously*, or if consequently the systems Xx and Zz move at the same time, Ww moves 2/3 of its maximum stroke as the lock of system Yy which remains in the drawing position has a different form, and in this case Ww still locks the system Yy which has not moved.

Finally if the pressure in the three receivers or in the three pipes c_1, c_2 and c_3 is released simultaneously, Ww moves its full possible stroke because the teeth d_1, d_2 and d_3 engage in the recesses of the three locks of Xx, Yy and Zz.

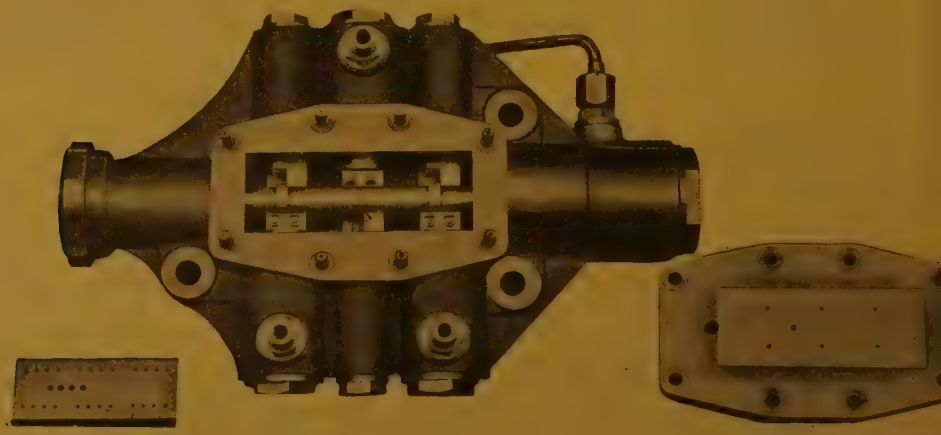
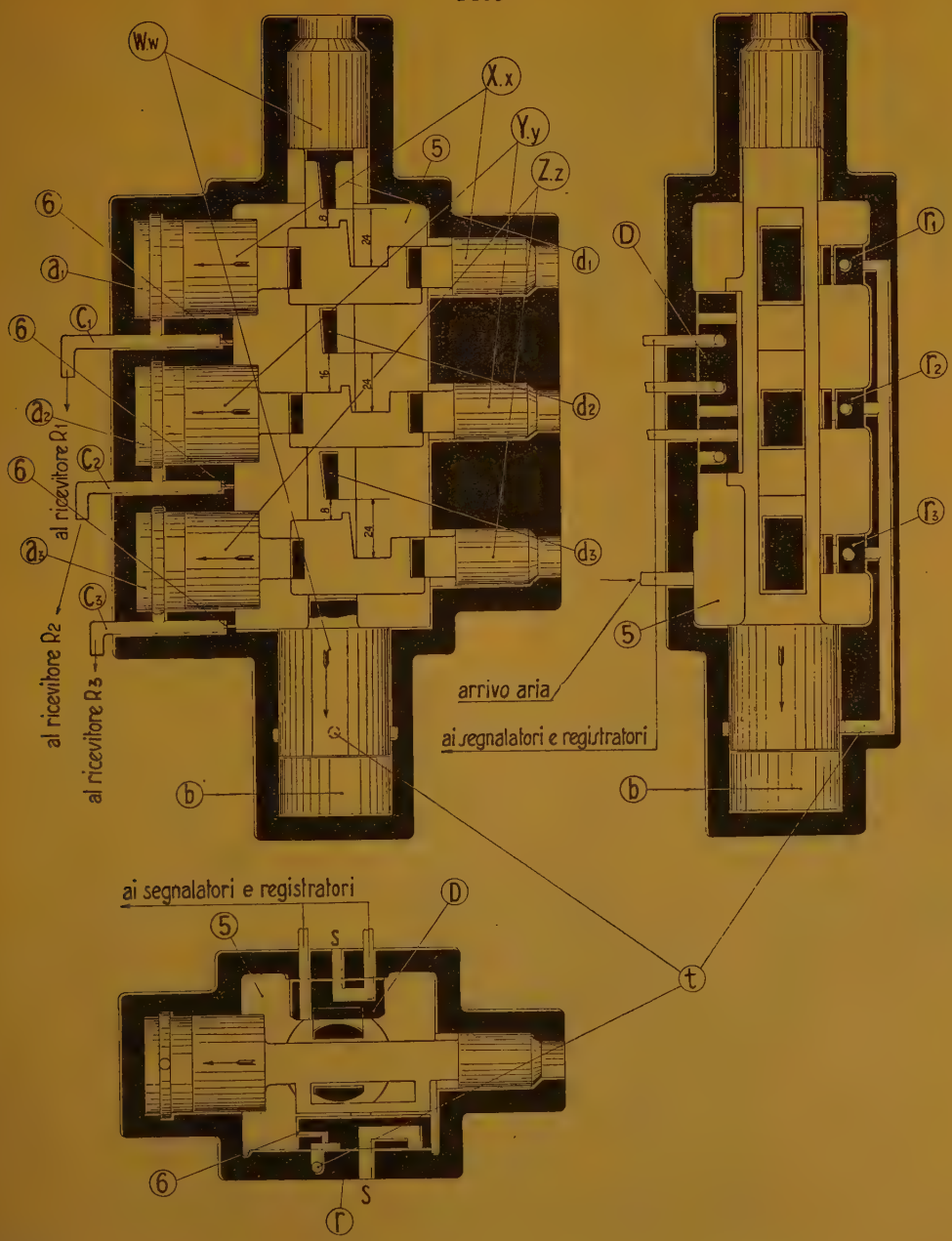


Fig. 7. — The combi

Explanat

Al recivetore = To receiver. — Arrivo aria = Air inlet.



and diagram.

ian terms:

nalatori e registratori = To signalling and recording devices.

In each case once W*w* has taken up a given position, the release of the other receivers in turn does not alter it, provided the whole assembly has not previously gone back to the initial position, which is only possible if the receivers which have been released have been recharged.

In moving, the assembly W*w* displaces a slide valve D. The result is that this slide valve D moves one third of its maximum stroke if only one receiver is released, and it remains in this position even should one of the other receivers be released subsequently or even if the other two receivers were released;

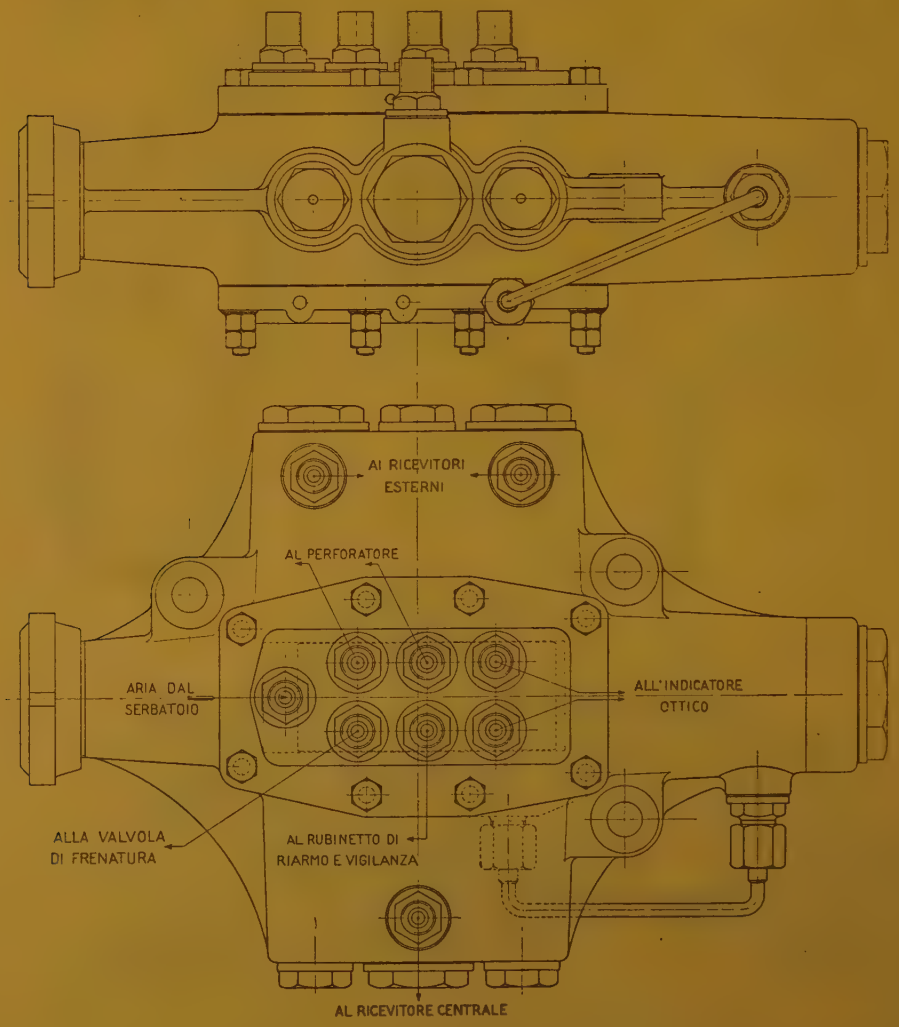


Fig. 8. — Plan of combiner.

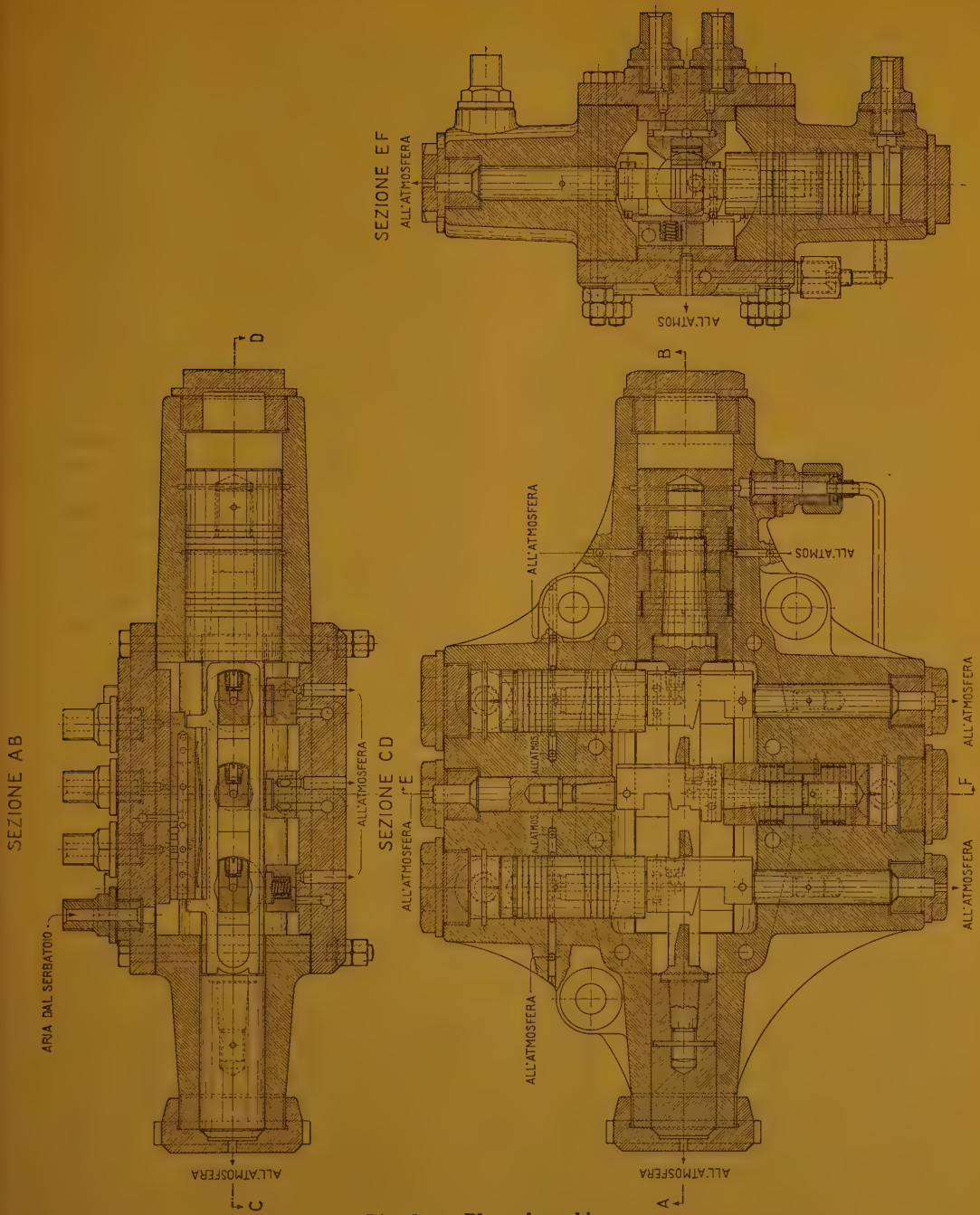


Fig. 8. — Plan of combiner.

it moves two thirds of its maximum stroke if receivers R_1 and R_3 are released at the same time and remains in this position even if receiver R_2 is subsequently released; it moves its full stroke if the three receivers are released simultaneously.

This slide valve D controls the pneumatic indicators and recorders by the uncovering and covering of a set of ports.

The arrangement is such that :

When the three receivers R_1, R_2 and R_3 are released simultaneously and consequently the slide valve D is moved its full stroke, *line clear* is indicated and recorded. For this purpose the three receivers must pass over an energised magnet in line with a signal showing line clear. When the receivers R_1 and R_3 are released simultaneously and when consequently the slide valve D moves 2/3 of its full stroke, *caution* (reduce speed) is indicated and recorded, the magnets M_1 and M_3 in line with a signal indicating *caution* must be energised;

Line occupied is indicated and recorded when one receiver alone is released with a movement of the slide valve D of one third of its stroke; for this purpose all that is necessary is that any one magnet in line with the signal showing « line occupied » be energised.

As a result of what we said above, one magnet at least outside the rails (fig. 9) must be energised in each case and at each signal; consequently magnet M_1 for example can be a permanent magnet, or in hardened steel without inductive windings, whilst the other two must be electro-magnets with the respective circuits connected to the signal to be repeated so as to satisfy the conditions laid down above.

In addition, another permanent magnet called the safety magnet is placed outside the rails in a position opposite that occupied by the first permanent magnet (fig. 9) behind the three magnets arranged on a line at right angles to the track.

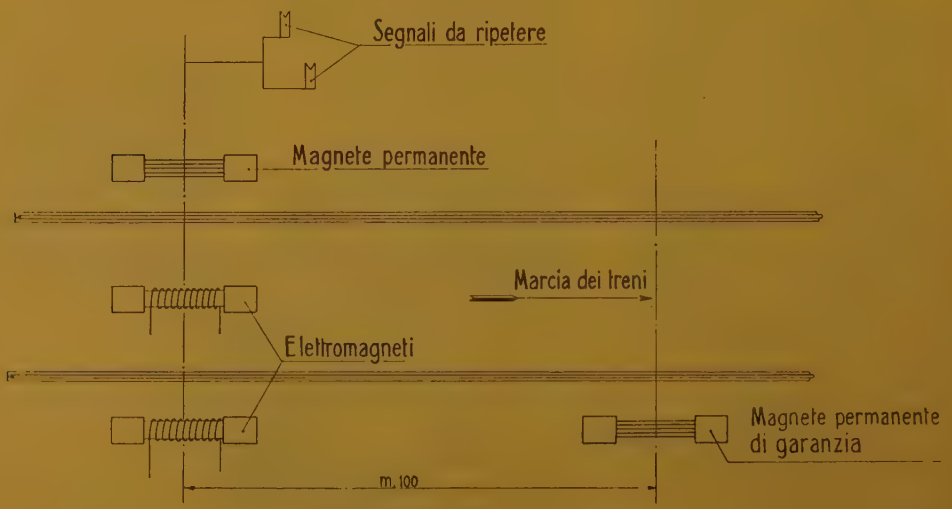


Fig. 9. — Position of magnets.

N. B. — Segnali da ripetere = Signals to be repeated. — Marcia dei treni = Running direction of train.

The following are the results to be obtained on the whole :

For the *line clear* indication not only must the signal be at *line clear,* but the whole of the equipment must be working properly as all the receivers and the rest of the equipment come into operation simultaneously; if any part should fail the indication caution or line occupied is given, i.e. an indication in the direction of greater safety, which at the same time reveals the fact that the equipment is out of order.

To obtain the *caution* indication, two receivers and the parts depending thereon must operate simultaneously. Should one of these be out of order, the safety indication, *line occupied,* is given.

To obtain the *line occupied* indication, only one of the receivers with the parts it controls must work. If this receiver is not working the other receiver controlled by the safety magnet comes into play and this receiver covers the first receiver to make sure that the *line occupied* indication is given. (Should it be considered necessary, a third safety magnet can be placed between the rails beyond the signal; the third magnet and the parts controlled by it would then form the third reserve to ensure line occupied being indicated should the two former fail to act. This, however, appears to be unnecessary as one of the basic regulations of railway operation is that safety can be taken as being covered when *two* simultaneous failures of apparatus or staff are required to cancel it).

As previously pointed out, the slide valve D of the combiner operated by W*w*, opens and closes the ports and controls the various indicators and recorders. The arrangements adopted are the following :

Normal repeater :

Receivers R_1, R_2 and R_3 under pressure;

Pipes c_1, c_2 and c_3 closed and consequently under pressure;

Pistons W*w* and slide valve D at the upper end of their stroke.

Passages opened through the slide valve D :

a, admission, *b*, admission, *c*, admission,
d, release, *e*, release, *f*, release.

Line clear repetition :

Receivers R_1, R_2, and R_3 released *simultaneously;*

Pipes c_1, c_2 and c_3 released;

Pistons W*w* and consequently slide valve D moved their full stroke 24 mm. (15/16 inch).

Passages opened through slide valve D:

a, admission, *d*, admission,
b, release, *c*, release, *e*, release, *f*, release.

Caution repetition :

Receivers R_1, R_3 released (as also when the locomotive is running in the reverse direction);

Pipes c_1 and c_3 open;

Pistons W*w*, and consequently slide valve D, move two thirds of their stroke (16 mm. = 5/8 inch.).

Passages opened through slide valve D:

b, admission, *e*, admission,
a release, *c*, release. *d*, release, *f*, release.

Line occupied repetition :

Receiver R_1 released (in the case of a locomotive running in reverse gear R_3 is released, but the result is the same).

Pipe c_1, open, pistons W*w*, and therefore slide valve D, move one third of their stroke (8 mm. = 5/16 inch.).

Passages opened through slide valve D:

d, admission, *e*, admission, *f*, admission.
a, release, *b*, release, *c*, release.

As has already been pointed out, the movement of the pistons W*w* locks, by means of the teeth d_1, d_2 and d_3 the transverse piston assemblies in whatever position they happen to be in; the result is that all the above mentioned passages opened up through the slide

valve D once open remain unaltered until the combiner returns to its normal position.

Constructional features of the combiner.

To prevent the transverse pistons receiving any violent shocks at the end of the stroke, which is only possible on the large-piston side, pipes c_1, c_2 and c_3 are designed with some clearance behind the large piston at the end of the stroke, in which the air is compressed momentarily to form a cushion.

The small pistons of all the differential systems are not fitted with piston rings, but in their normal position their coned faces make a joint against a suitable seat to prevent the continual loss of air from the central chamber to the atmosphere.

The movement of piston W*w* is delayed a fraction of a second so that all the transverse pistons which ought to move to exhaust their respective receivers have had time to move before being locked by cams d_1, d_2 and d_3. For this purpose the pipe *t* ends at the point shown on the drawing. The system W*w* obviously starts to move, not at the moment when the pipe *t* is being exhausted, but when as a result the chamber *b* is empty itself, by leakage past the extreme end of the piston.

Finally it should be noted that if the small constant feed passages 6 become choked, this does not involve any danger seeing that the sole consequence would be that the combiner would not return to its normal position.

Optical indicator.

This consists of a small frame with a black shutter protected by glass (fig. 10). Through the horizontal openings in this shutter, the colours of a mobile screen 2 are shown. This screen shows through the slits in the shutter, black when the field is black, corresponding to the *normal* position; white and green stripes corresponding to *line clear;* white and yellow corresponding to *caution;* and white and red for *line occupied.*

The mobile screen 2 is controlled by the spindle of a lever 3 constantly forced down by a spring 4. The ends of the lever 3 can be raised respectively by the spindle of two pistons 5 and 6 free to move in cylinders 7 and 8, with a variable stroke.

The two cylinders 7 and 8 being open to exhaust, spring 4 forces the screen down to the bottom position; if cylinder 7 is open to admission and cylinder 8 to exhaust, the screen rises a certain amount; if cylinder 8 is open to admission and cylinder 7 to exhaust, the screen rises still further; and finally if the two cylinders 7 and 8 are open to admission the screen rises a still greater amount.

Examining figure 2 and the pipes starting from the combiner, which are controlled by slide valve D, the following passages are opened :

Line occupied :	*a*, exhaust,	*b*, exhaust.
Caution :	*a*, exhaust,	*b*, pressure
Line clear :	*a*, pressure,	*b*, exhaust,
Normal position :	*a*, pressure,	*b*, pressure.

It should be noted that if the pressure is lacking, the indicator shows line occupied, and that to get the normal indication, pressure must be re-established in the two passages *a* and *b*.

Audible indications.

The audible indications are given by two whistles of different tones, fed by slide valve D of the combiner through the passages *d* and *e*, which also feed the recording perforators..

For line clear, whistle f_1 is brought into action, for caution whistle f_2, and for line occupied the two together.

Safety valves.

To prevent, through accidental loss of air pressure or a mistake by the driver,

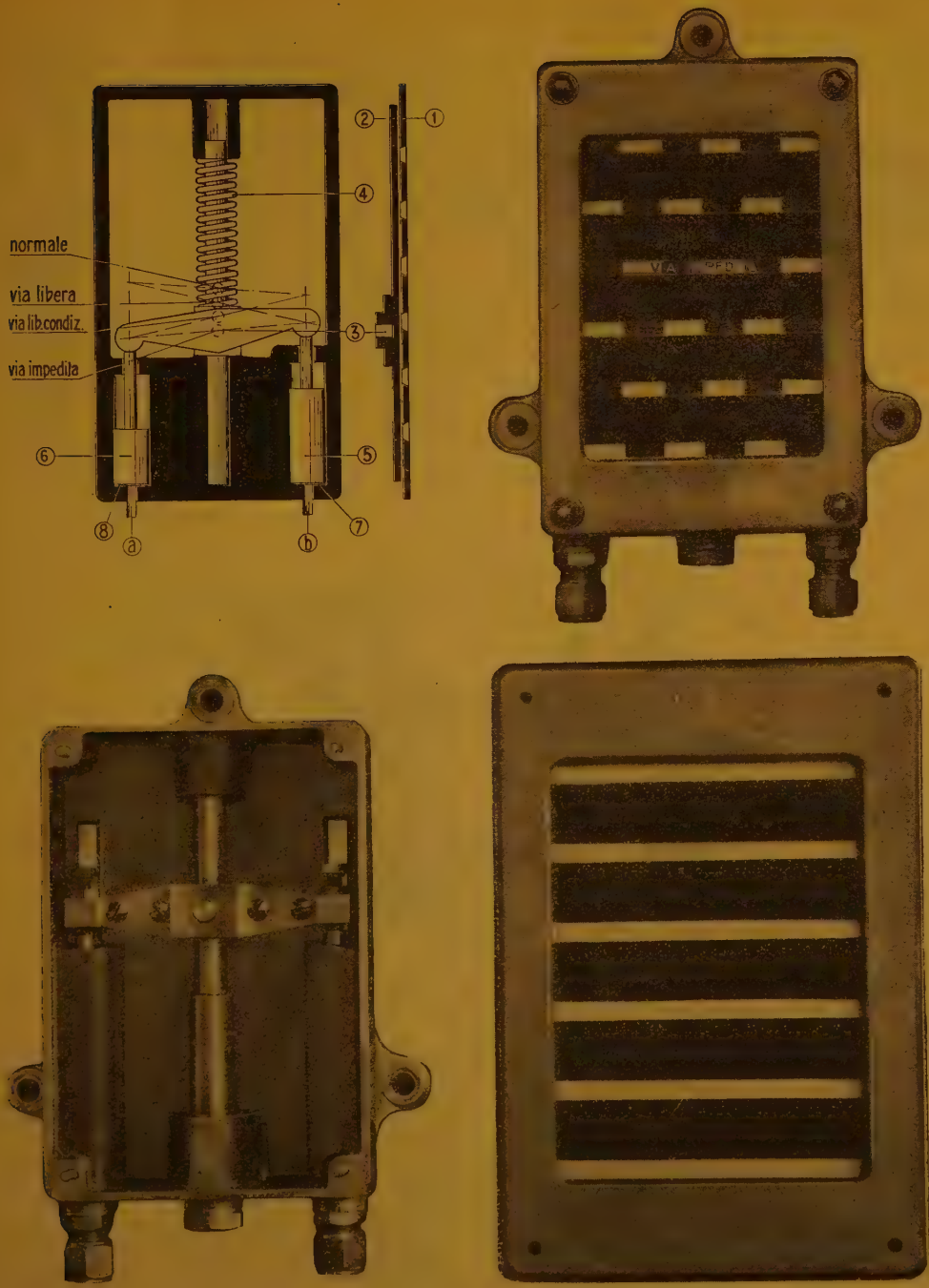


Fig. 10. — Optical indicator.

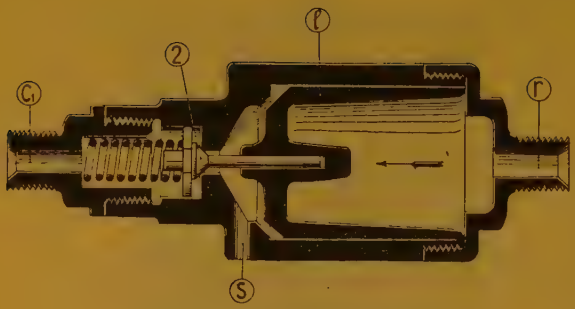


Fig. 11. — Safety valve.

the recharging passages remaining unexpectedly under pressure and so paralysing the working of the receivers and consequently the signal repeater, the safety valves shown in figure 11 have been fitted.

Figure 11 clearly shows that whilst there is pressure in the recharging passage, piston 1 moves in the direction corresponding to the opening of valve 2, passage c_1 is open to exhaust *s*, and the combiner can neither take up nor remain in its normal position.

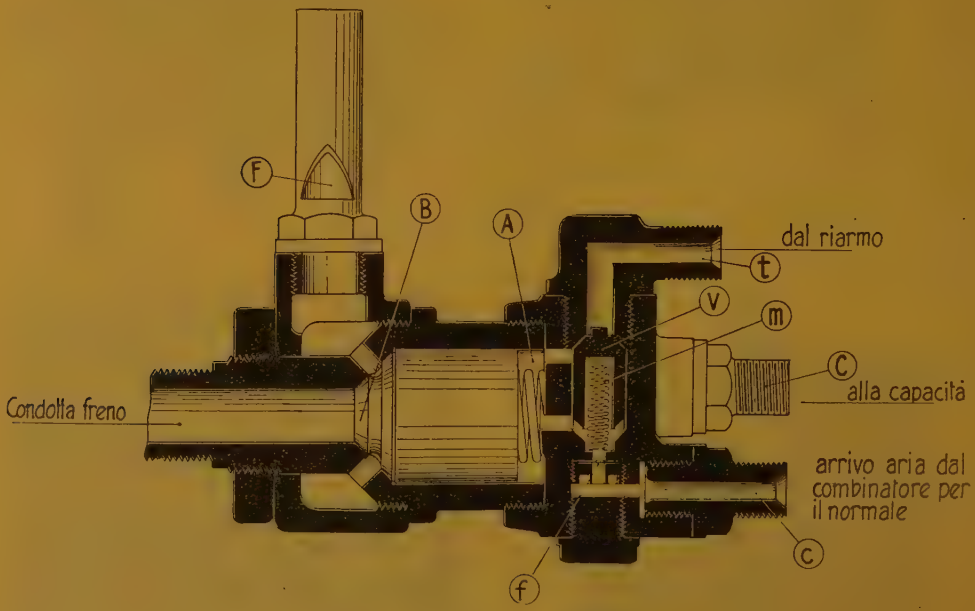


Fig. 12. — Brake valve.

Explanation of Italian terms:

Dal riarmo = From recharging supply. — Alla capacita = To clearance. — Arrivo aria dal combinatore per il normale = Air from combiner for normal position. — Condotta freno = Brake pipe.

Brake valve.

This valve is shown in figure 12.

The pipe *c* communicates with the combiner (fig. 2) which, by slide valve D, opens it to admission for the *normal* position and to release for all other positions.

The pipe *t* communicates with the driver's valve and is therefore under pressure when the driver uses this valve.

The method of working is as follows :

If the combiner is in the normal position, compressed air passes through

pipe *c* and chamber A comes under pressure and the train brake pipe is shut off.

If the combiner is set for any particular indication the pipe *c* is open to exhaust, the air from chamber A and clearance C exhausts through this pipe and the small opening *f* and at the end of about 5 seconds the valve B opens a passage to the compressed air of the automatic continuous brake; the air exhausts to atmosphere through the whistle F, applies the brakes, and sets off the alarm (the noise made by this alarm is so loud that the whole of the train staff as well as the passengers cannot fail to hear it).

If when the small chamber C is open to exhaust, and the valve B is either opened or closed, the driver sends air into the pipe *t* by operating the recharging valve, valve *v* moves and compresses the spring *m*, it comes against the other seat and allows air to pass towards A and C, so that the valve B cannot open, or closes if it is open. When the recharging process ends, the combiner returns to its normal position, *c* commences to be fed again, *t* is open to exhaust (through the recharging valve) and the whole unit returns to the position shown in figure 2.

Recording perforators.

The recording is done by perforation of the speed recorder band.

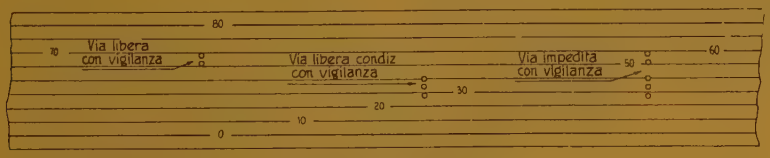


Fig. 13. — Examples of recorder band perforations *with* vigilance indication.

Explanation of Italian terms:

Via libera = Line clear. — Via libera condiz. = Caution. — Via impedita = Line occupied (stop). — Con vigilanza = With vigilance indication.

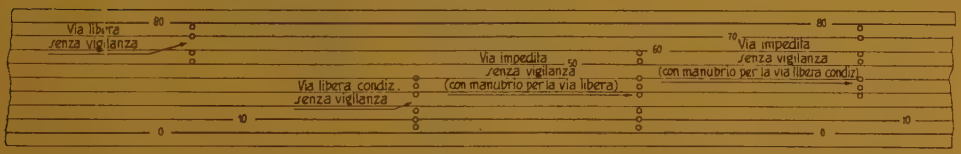


Fig. 14. — Examples of recorder band perforations *without* vigilance indication.

Note: Senza vigilanza = Without vigilance indication. — Con manubrio per la via libera = With handle in line clear position.

The perforators record the position of the signals repeated by means of the perforations shown in figure 13 when the driver has recognised the signal position before the repeater operates and has made the conventional movement corresponding to the position of the signal; otherwise the record made is like that shown in figure 14.

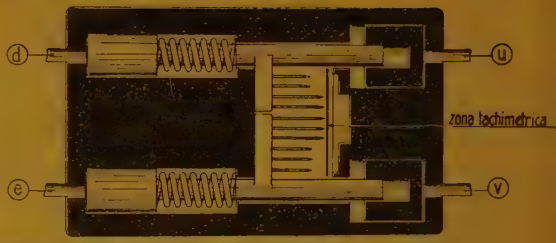
The perforator is shown in figure 15.

The speed recorder band is shown in section; the passages *d* and *e* com-

municate with the combiner and are controlled by the slide valve D in the following way :

Normal position :	*d*, *exhaust*,	*e*, *exhaust*,
Line clear :	*d*, *pressure*,	*e*, *exhaust*,
Caution :	*d*, *exhaust*,	*e*, *pressure*,
Line occupied :	*d*, *pressure*,	*e*, *pressure*.

If passages *u* and *v* are open to exhaust, the perforators 1 and 2 move their full stroke and make one of the perforations shown in figure 14. If, on the other hand, air also gets into the large cylinder on the same shaft (that controlling the perforator), the stroke of the perforator is limited so that the long points only act and make perforations like those shown in figure 13.



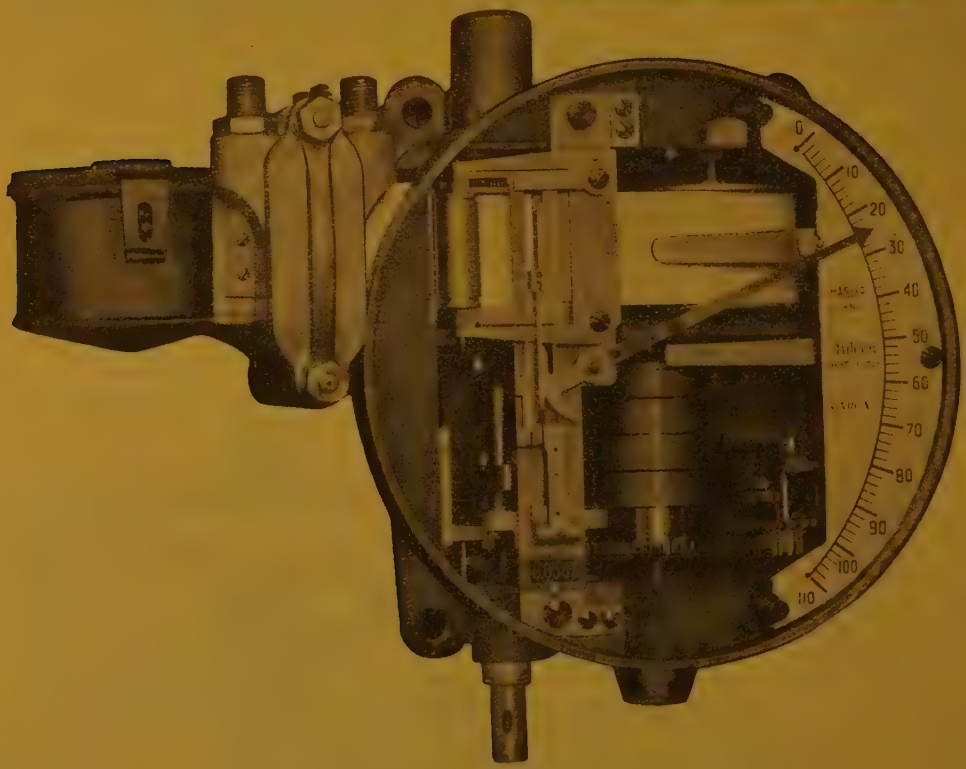


Fig. 15. — Perforator : Diagram and view.

The air admitted to the passages *u* and *v* is taken from the supply pipe and passes through the driver's vigilance valve, so that in the position of the latter corresponding to line clear fresh air is fed through passage *u*, and for the position corresponding to caution, through passage *v*.

When the vigilance device is operated to show line occupied the stroke of the

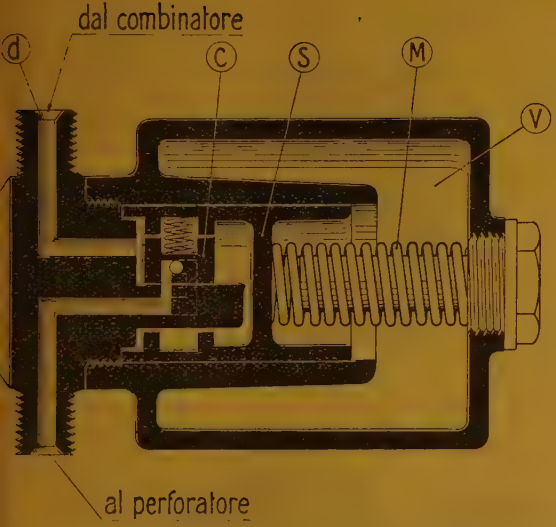


Fig. 16. — Device for rapid restoration of perforators to ready position.

two perforations is limited, so that if it were made with the same system of pistons, the vigilance record would be made even with the two other indications. This is prevented by sending, to show vigilance with line occupied, air from the combiner through passage *f* to the passages *u* and *v* only when the combiner is set for line occupied and the air has always to pass through the vigilance valve which opens the passage only when occupying the position corresponding to vigilance for line occupied. In this case, the air which acts on the perforator pistons is controlled by slide valve D simultaneously with the air operating the large pistons which limit the stroke of the perforators; to give the large pistons time to do what is expected of them before the short stylets have perforated the paper, two small recesses are set in passages *d* and *e* which act as retarders.

Device to ensure quick return of the perforators to their normal position.

To prevent the speed recorder band, which is continually moving, bein torn by the long time the perforators stop when in action, the device shown in figure 16 has been inserted in the pipes *d* and *e* (fig. 2). The method of operation (for one of the two) is as follows :

When the combiner is in its *normal* position, pipe *d* (or *e*) is open to exhaust, the reservoir V of the part not occupied by the piston S discharges, the spring M pushes the unit formed by piston S and slide valve C towards the left, and the tube conveying air to the perforator is opened to exhaust.

As soon as the combiner feeds air into the small passage *d* the pressure only acts for a moment on the left hand side of piston S which is moved to the right by overcoming the spring M and taking with it the slide valve C which closes the exhaust opening and admits air to the perforator. However, as soon as the space V is filled by air passing round piston S, the pressure on the two faces of the latter is equalised, and the spring M restores the mobile unit to the left, i.e. in the position shown on the drawing, and the perforator being opened to exhaust is then withdrawn from the paper.

When the combiner resumes its normal position, the space V empties, and the equipment is again ready to work.

Recharging and vigilance valve.

The recharging and vigilance valve is shown in figure 17.

The centre part, consisting of two valves on the same spindle and controlled by the pulsator P, is used for recharging, and the whole is so arranged that if the pulsator is released, the valve v_1 shuts off the admission of air and the valve v_2 opens the recharging pipe to exhaust; contrariwise, when pressing the pulsator the valve v_2 closes the release of the recharging passages and the valve v_1 opens them to admission.

The air introduced into the recharg-

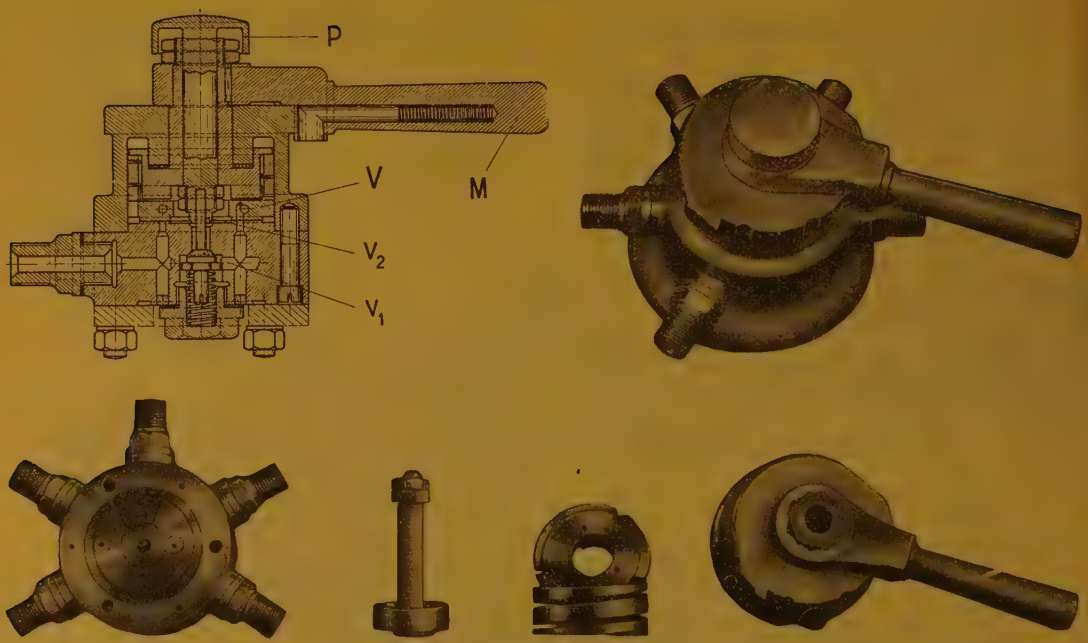


Fig. 17. — Recharging and vigilance valve.

ing pipe recharges the receivers and at the same time passes to the safety valve and to the pipe *r* of figure 2 which puts the brake valve out of action.

The disc valve V, controlled by the small handle M, is the vigilance valve, the whole being arranged in the following way :

The horizontal handle corresponds to vigilance for line occupied (repeating the position of the signal arm for line occupied) and the disc valve V sends the air from the combiner — if the latter is in position for line occupied, or in other words if the signal really is at line occupied — to the two passages *u* and *v* so as to stop the two perforators at mid-stroke.

The handle pointing downwards corresponds to caution and the disc valve V sends air taken from the direct arrival to the pipe *v* so as to limit the stroke of the respective perforator, if the latter comes into action, i.e. if the signal really shows caution.

The handle inclined vertically downwards corresponds to line clear and the disc valve V sends air taken from the arrival pipe direct to pipe *v* so as to limit the stroke of the respective perforator, if the latter is brought into action, i.e. if the signal really indicates line clear.

From the above, it is clear that if the driver has not repeated by means of the small handle of the vigilance valve the actual position of the signal arm, the perforation on the speed recorder band reveals his mistake or his lack of attention.

Application of the repeater to locomotives with two cabs or rail motor cars with two driving compartments.

There is no change as regards the receivers, the combiner, the brake valve, and the perforators.

Two optical indicators, however, are required, one per driving compartment, arranged in parallel. Two pairs of whistles are also required, one in each compartment, with the two corresponding units in parallel.

Two recharging valves and two vigilance valves are required, one per compartment.

The air supply can then be sent by either of the two recharging devices, as the double valve shown in figure 18 automatically makes the necessary connections; the air for the vigilance valve will be fed into passages *u* and *v* by the transmitter valve shown in figure 19, which should be suitably arranged according to the cab the driver uses, so that the air for the vigilance device will be taken by the vigilance valve of the cab in use without being affected by air from the vigilance valve in the unoccupied driver's stand.

Permanent way equipment.

This equipment consists of electro-magnets with their controls and power supply, and of permanent magnets.

Fig. 18. — Double recharging valve.

Explanation of Italian terms:

Dal robinetto di riarmo cabina anteriore (posteriore) = From recharging valve in leading (trailing) driver's compartment. — Al riarmo ricevitori = Recharging of receivers.

Figure 21 shows one of the electro-magnets, figure 22 a permanent magnet, and figure 23 shows them in position.

These figures show that all details have been designed in a practical manner, sufficiently strong for attachment to the sleepers, and also protected

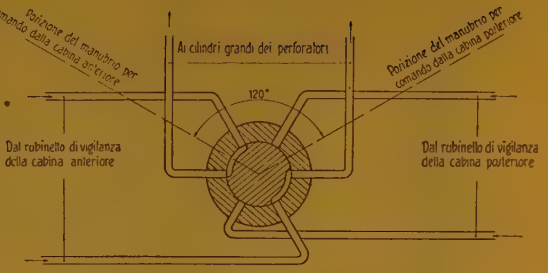

Posizione del manubrio per comando dalla cabina anteriore
Ai cilindri grandi dei perforatori
Posizione del manubrio per comando dalla cabina posteriore
120°
Dal rubinetto di vigilanza della cabina anteriore
Dal rubinetto di vigilanza della cabina posteriore

Fig. 19. — Transmitter valve.

Explanation of Italian terms:

Posizione del manubrio per comando dalla cabina anteriore (posteriore) = Position of handle for control from leading (trailing) driver's compartment. — Ai cilindri grandi dei perforatori = To large cylinders of perforators. — Dal robinetto di vigilanza della cabina anteriore (posteriore) = From vigilance valve in leading (trailing) driver's compartment.

against possible blows from anything on the trains.

The characteristics of the windings of the electro-magnets are the following:

Diameter of copper wire .	25 S.W.G.
Number of turns	20 000
Resistance	360 ohms.
Voltage (supply side) . .	36
Amperes-turns	2 000

Figure 24 shows the method of feeding the electro-magnets according to the position of the signals; as can be seen from the diagram the electro-magnets not taking energy are short-circuited.

The electric current is supplied by cells of large capacity or by accumulators charged by metal rectifiers at places where electric power is available.

The batteries are generally fitted in cupboards close to the signal; they are installed in the station, the most convenient arrangement so as to centralise the charging equipment, thus making it available for the whole of the signals of the station, or because it is easier to obtain a supply of electricity from outside sources.

In this connection, it should be noted that with this system the line current

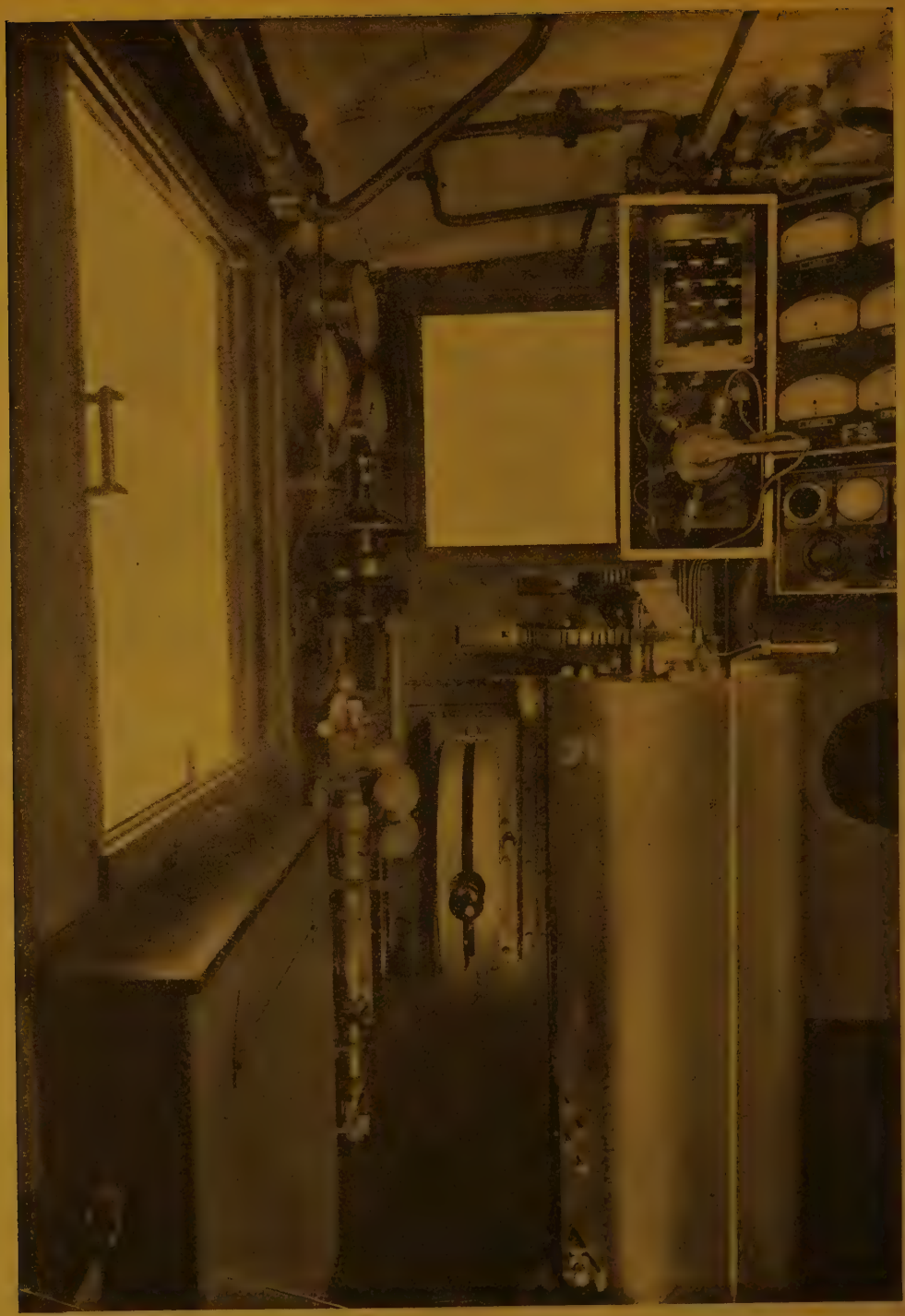


Fig. 20. — View of driver's compartment on electric locomotive with repeater equipment.

Fig. 21. — Electro-magnet.

Fig. 22. — Permanent magnet.

can be dispensed with, as the permanent way electro-magnets can be energised by currents induced by the magnets on the locomotive at the desired moment in grounded circuits.

It was not considered advisable to adopt this solution because of the complications involved, and it would have meant giving up the present and future benefits from using electric energy from the main distribution system, available in many stations, and at many signals, and which will be more generally available in the future.

The type and position of the track magnets and consequently the position of the locomotive receivers have been selected so as to prevent any interference or disturbance due to the magnetic fields set up by the currents in the rails of electrified lines, fields which, particularly in the case of direct-current lines, can be quite high in intensity.

The magnetic lines of force due to the current in the rails are in the form of circles concentric relatively to the centre line of the rails and in planes at right angles to this centre line; in other words, they lie in planes perpendicular to the two track magnets or to the two receivers on the locomotive and consequently have no components affecting them. Practical experiments confirm this — with a wide margin — both as regards the intensity of the current and the distance which separates the receivers from the rails through which the current passes.

The intensity of the magnetic field of the track magnets can be checked continuously by the signal box; for this purpose magnetic contactors are arranged close to the track magnets, the working of which is similar to that of the locomotive receivers in that the armature tends to open, by means of a spring, a circuit controlling an indicator in the signal box, whereas the magnetic action tends to turn the armature by neutralising the action of the spring so as to keep the circuit closed.

Obviously, the spring can be adjusted so that the control circuit opens as soon as the magnetic field becomes sufficient, and all the more so should it fail.

This arrangement was considered unnecessary in practice, as the danger indication is controlled by a permanent magnet and guaranteed by another permanent magnet placed about 110 yards further afield; the demagnetisation of these magnets has been found to be very slow, and progressive.

For some years the value of the magnetic field of permanent magnets has been recorded; the curve obtained from these records shows that whereas during the first year the demagnetisation progresses rather quickly, it subsequently falls off more slowly, and what it more important, regularly. This regularity gives complete assurance as regards the efficiency of the permanent magnets because the records over long periods prove with mathematical certainty that the magnetic field retains the necessary value to operate the locomotive receivers, or in other words to guarantee the indication of danger by simple steel parts carried on the sleepers without any current supply, and consequently without any windings.

Greater safety could not be obtained with equally simple equipment.

Application of the cab signalling equipment to single lines.

As we have already said, cab signalling is of less value on single lines on which traffic and speed are generally limited. When, however, its installation is desired, the repeater must not work at the last signal of the station or signals not applying to trains leaving the station.

This is done in the following way: the magnets of the repeating equipment of the single-track line are all electromagnets that is with inductive windings. These windings are connected to a pedal of the type usually used on the Italian Railways; this pedal is operated by the wheels of the vehicles and remains set for a certain period (about 30 seconds); it is placed 22 yards beyond the magnets, in the running direction of the train to which the signal applies, and cuts out the excitation current of the electro-magnets when it is depressed.

Obviously in the case of trains running in the direction to which the signal applies this period has no effect, i.e. the magnets are only cut out after they have already operated the locomotive receiver; contrariwise, in the case of the station departure signals, i.e. those met by the trains to which they do not apply, the magnets are cut out before the locomotive reaches them. Consequently as the electro-magnets remain cut out during a suitable length of time, they are not energised when the locomotive passes them, as no magnetic field is set up and the corresponding receiver is not affected.

* * *

The working of the apparatus has already been covered by the description of the various parts; in the first place amongst the most important characteristics is the sturdiness of the different parts of both the permanent way and locomotive equipment. Everything is robust and well designed from the constructional point of view; nor does any part require any careful adjustment or easily get out of order.

The receiver itself, which appears to be the most delicate part, is however so strong and sturdy that the armature between the two pole pieces cannot be displaced by mechanical shock and release the receiver. The receiver has been tested by striking it on all sides with a hammer and by dropping it from a considerable height without release taking place. The release can only occur when a sufficiently strong magnetic action is set up.

Fig. 23. — Track magnets in service.

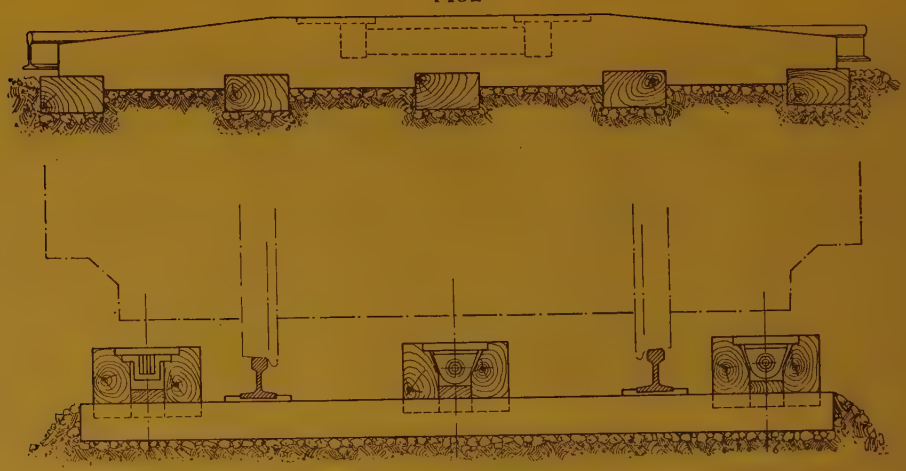


Fig. 23. — Track magnets in service.

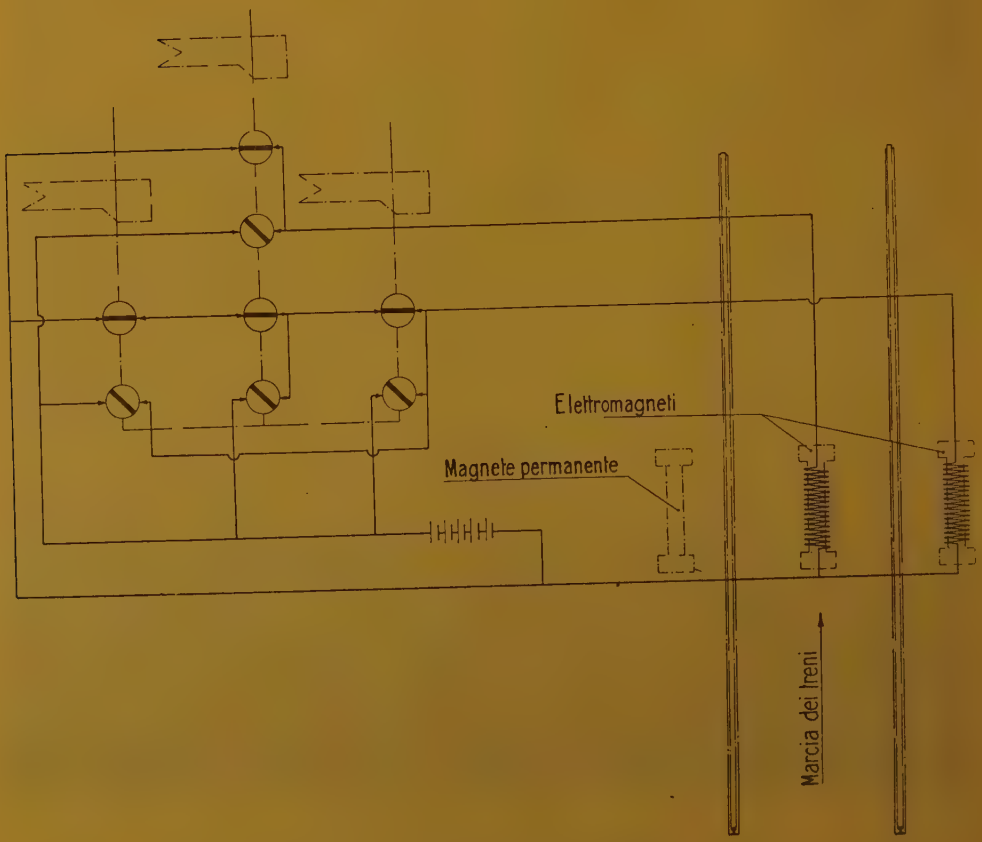


Fig. 24 showing how the electro-magnets are fed.

Fig. 25. — Electric locomotive fully equipped.

Note. — Ricevitore = Receiver.

The other parts are no more delicate than other existing locomotive details.

The permanent way equipment is very strong and there is no moving part other than the electric contact of the semaphore arm to give its two positions; this contact in no way differs from those already fitted on the same arm to control its position in connection with the station working.

* * *

For the three indications, audible signalling has been deemed desirable in addition to the optical signals, as it affects another sense than sight, or because this sense in no way distracts from the observation of the signal and consequently causes the driver to act if only to stop the annoyance of the whistle in his cab or the two combined whistles in the case of line occupied.

* * *

A *positive* repetition was desired both for line occupied and line clear so as to comply with the principles laid down at the beginning of this article and also because the staff is able to see at each signal if the apparatus is working properly or not. This is of particular value, especially in the case of high-speed

trains, for which, in view of their importance, the signals are usually off : If the apparatus did not repeat line clear the driver would be deprived during practically *the whole of the journey* of the means of making sure that nothing had gone wrong in the equipment and consequently would not know that the apparatus has been out of order for some time. It is advisable, on the contrary, that he should be able to satisfy himself at each signal, whatever its indication, that the apparatus is working properly or if a defect is to be made good.

* * *

From the description it might appear that the apparatus does not meet the condition that the brakes are not to be applied.

Actually there is nothing in this, as usually the brake is applied by the driver alone for well known reasons which may be summed up in the phrase that « the man must be left wholly and solely responsible for the safety and regular running of the train ». It may happen, however, that the enginemen may not be able to obey the signal requiring the train to stop, either on account of illness, accident, or other serious cause. The repeater only acts and gives the alarm signal which can be heard by all the train staff and the passengers and then applies the brake in the sole event (which in practice hardly ever occurs) of the locomotive staff not obeying the order to stop, even after an appreciable lapse of time (for example 5 seconds); if this happens there is something seriously the matter on the locomotive and obviously in this case it would not do to let the train run into danger. Then too the enginemen can easily not only prevent the alarm being given and the brakes applied before the end of the period mentioned (for example 5 seconds) if the home signal was overrun through some less serious cause than the above, but can even cut out the alarm and stop the brake action after they have started. The responsibility for, and the control of, the train are always left to the driver.

Consideration of the various defects or possible irregular action and the effects thereof.

The possible defects may be divided into four different kinds : electrical, magnetic, pneumatic and mechanical.

Electrical defects.

As we have seen above, this can only affect the permanent way equipment. Whatever they may be : defective circuits, short-circuits, batteries run down, etc., they affect the line clear indication and to a lesser extent the caution indication in the sense that in case of irregularity these indications are altered into others of greater safety, i.e. instead of indicating line clear, caution or stop would be given, and instead of caution, stop.

The stop indication, which depends upon the permanent magnets alone, whilst the electro-magnets are de-energised and short-circuited, is not the least affected by defects or failures of this kind.

Magnetic defects.

The permanent magnets alone can be affected by being displaced or becoming demagnetised.

The magnets are not likely to be moved as they are within the building gauge and are well protected. Demagnetisation, as has already been said, is progressive and very slow; experience has shown that permanent magnets retain sufficient magnetisation for at least ten years.

In any case, a permanent record of the magnetic fields can be kept in the signal boxes as described above.

Furthermore, the first indication *not given* when the permanent magnets have lost their magnetisation is line clear. This indication is only given when the equipment is in full working order, and, if not given, something must be out of order. Line occupied can only not be indicated if all the permanent magnets fail as well as all the other precautions provided.

Pneumatic defects.

The whole of the equipment, with the exception of the perforation device, operates by reduction of pressure; consequently any defect of a pneumatic nature, such as leakage of air, failure of supply, etc. shows itself at once and a sudden failure cannot give a false indication.

In any case of failure of the pneumatic equipment, the device *leaves* its normal position to which it can only be restored when the defect has been made good.

Mechanical defects.

If the various parts are well made and assembled, defects are very improbable and this has been proved by experience. Then too, the equipment consists of three main units which must all act correctly to give the line clear indication. Consequently as soon as anything gets out of order it is brought to notice at once. The *stop* indication, the most important to be given, depends upon only one of the main units working, that is on one third of the equipment, the other two units, which are always checked at each signal, forming two separate reserves for the first unit should this fail when the *stop* indication should be given.

The possibility of the repeater failing to give indications or giving false indications.

This could occur at the signal under the following conditions :

As regards the *track :* if the three magnets were out of place at the same time or if the permanent magnets became almost completely demagnetised simultaneously. Apart from the improbability of such a thing, the system includes the means of guarding against this eventuality by checking the fields of the track magnets as described above.

As regards the *locomotive :* simultaneous failure of the three pneumatic devices corresponding to the three receivers built into the locomotive equipment without also causing a leakage of air, which would result in the repeater moving from its normal position to which it could not return. As can be seen, this is practically impossible.

The most serious incorrect indication given by the repeater would be *line clear* instead of *caution*, or *stop*.

This false indication could be given under the following conditions :

As regards the *track :* the electro-magnets receiving current when they should not; these electro-magnets which should only be energised when the line is occupied, not only are not energised, but their windings are short circuited; even in this case the continuous check on the magnetic fields, kept by the station, should reveal the defect.

As regards the *locomotive :* at the exact moment (within one tenth of a second) when a receiver should be released, the pressure is reduced in the other units of the two other receivers and this reduction of pressure must not last more than 5 seconds to make it possible to recharge the system and prevent the brake valve acting.

As in the previous case, this is quite out of the question.

On the other hand, each time *line clear* is indicated, as the result of the whole of the track and locomotive equipment working properly, the whole of the electrical, pneumatic, and mechanical equipment must be in proper working order; any delay, imperfection, and the more so any damage results in giving the indication *caution* or *stop*, which

shows that there is something out of order; as the *stop* indication is given by one third of the equipment, the other two units provide ample reserves.

* * *

If it is admitted that the railways are satisfied with the degree of safety provided when two defects of mechanisms or lapses by the staff have to occur simultaneously to destroy it, with this equipment more than two defects must occur for the apparatus not to work or for a false indication of line clear to be given, and under conditions of simultaneousness and conflicting circumstances which, we have no hesitation in affirming it, it would be difficult to arrange artificially so as to cut out repetition of the signal or to get a false indication of line clear.

To conclude, we would point out that the repeater is *additional* equipment and consequently the safety it gives *supplements* the existing safety of railway working. This arrangement only adds to safety already considered sufficiently covered.

With such complete and reliable equipment it is possible to think of it *taking the place of the permanent way signals* instead of acting as an addition thereto.

Even after long experience, during which the equipment has operated several millions of times, which has convinced us that the repeater never fails on the side of danger, so extreme a solution should not be entertained, as it must not be overlooked that the signals are not only used by the enginemen, but also by the permanent way and station staff, besides being seen by everybody, including the passengers.

Abolition of the permanent way signals, therefore, cannot possibly be considered.

If anything might be suppressed, in accordance with the theories enunciated above, it is the organisation and the very heavy expenditure involved in using fog signals. The reliable cab signalling equipment could supersede this subsidiary service, and were fogs are heavy and frequent large savings could be effected. The capital cost of the equipment would be paid off very quickly in this way.

Florence, March 1935.

[621. 132.3 (.43) & 621. 132.8 (.43)]

New German streamlined 4-6-4 type locomotives.

(The Railway Gazette.)

A further stage in the development of the German State Railway Company's programme of higher speeds for all classes of railway traffic is marked by the successful trials of the new streamlined locomotives, Series 05, built by the Borsig Lokomotiv-Werke, Hennigsdorf, Berlin. These engines were designed for a speed of 175 km. (108.7 miles) an hour. Actually, a speed of 181 km. (112.4 miles) an hour was reached by the first of the series during trials on the Berlin-Magdeburg line, and the second locomotive has attained 192 km. (119 miles) an hour on a test run between Berlin and Hamburg.

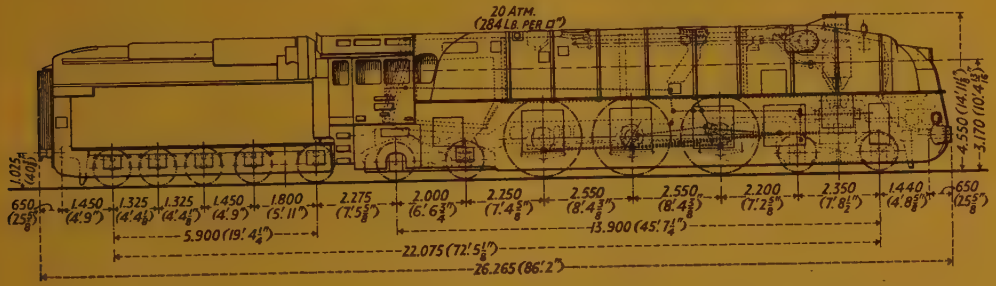


Fig. 1. — General arrangement of the new three-cylinder single 4-6-4 streamlined locomotives, German State Railways.

The leading dimensions of the new locomotives are as follow :

Cylinders, diameter	450 mm. (17 11/16 in.).	
» stroke	660 mm. (26 in.).	
Coupled wheels, diameter	2 300 mm. (7 ft. 6 1/2 in.).	
Bogie and tender wheels, diameter	1 100 mm. (3 ft. 7 1/4 in.).	
Boiler working pressure	20 atm. (284 lb. per sq. in.).	
Boiler heating surface :		
Tubes and flues	237.4 m²	2 554.4 sq. ft.
Firebox	18.6 m²	200.1 sq. ft.
	256.0 m²	2 754.5 sq. ft.
Superheater	90.0 m²	968.4 sq. ft.
Total	346.0 m²	3 722.9 sq. ft.
Grate area	4.7 m² (50.6 sq. ft.).	
Wheelbase, rigid	5 100 mm. (16 ft. 8 3/4 in.).	
» total engine	13 900 mm. (45 ft. 7 1/4 in.).	
Weight of engine in working order	126.7 metric tons (124 tons 14 cwt.).	
Adhesion weight	56.3 metric tons (55 tons 8 cwt.).	
Tender, weight in working order	85.7 metric tons (84 tons 7 cwt.).	
Water capacity	37 m³ (8 140 gallons).	
Fuel capacity	10 metric tons (9 tons 17 cwt.).	

Three of these locomotives have been ordered from the Borsig Lokomotiv-Werke with a view to the haulage of 250-ton trains in regular service at a schedule speed of 150 km. (93.2 miles) an hour, with a sufficient margin of power to permit running at 175 km. (108.7 miles) an hour to make up lost time. Two of the locomotives, of which that illustrated and described herewith is one, are grate-fired machines having the usual general arrangement; the third, which will shortly be completed, is to be fired with pulverised coal, and has the driver's cab in front. All three are provided with streamlined casings which, in conjunction with the improvements in coal economy effected during recent years, are essential factors in the present commercial development as distinct from the experiments conducted some thirty years ago (*).

It is estimated that when the locomotive is developing 2 500-3 000 H.P. and running at about 150 km. (93.2 miles) an hour, a saving of about 20 % in the power otherwise required is effected by the streamlining, which is made substantially continuous between locomotive and tender by means of side flaps. All projecting parts of the locomotive and tender are either enclosed within the casing or themselves streamlined, but provision is made for ready accessibility to the motion work and fittings by the numerous doors and shutters visible in the accompanying illustrations.

Preliminary investigations.

Before deciding upon the complete enclosure of the locomotive and tender by a streamlined casing extending practically to rail level, exhaustive wind-channel tests were made in the aerodynamic laboratory, Göttingen, and in the Technische Hochschule, Berlin, on wooden models built by the Borsig Lokomotiv-Werke to scales of 1 : 33 and 1 : 20. These models reproduced faithfully all the details of the designs under consideration, and the most favourable form of enclosure was ascertained by interchanging various parts.

The proposal to include the motion work in the streamlined casing raised the question whether the elimination of direct air cooling would result in hot bearings. In order to settle this problem, the German State Railway Company undertook preliminary trials with an ordinary express locomotive fitted with a casing to enclose the motion work. The results of these trials were reassuring, the temperature of the bearings being increased by only a few degrees, no difficulties of any kind being experienced. The experimental locomotive was also fitted with a parabolic cap on the front of the smokebox and the front of the driver's cab was given a sloping or tapered form, resulting in reduced wind resistance equivalent to an additional 150 to 200 H.P. available at the drawbar at 140 km. (87 miles) an hour. A part of this gain in effective power is attributable to reduced heat loss from the cylinders, and this rather adds to than detracts from the advantages of the enclosure.

Boilers details.

The boiler barrel consists of two 17.5-mm. (11/16 in.) plates, the front plate being of 1 900-mm. (6 ft. 2 13/16 in.) inside diameter. To save weight, the plates are of 0.4 % molybdenum steel with a tensile strength of from 48 to 55 kgr. per mm² (30.5 to 34.9 Engl. tons per sq. inch). In consideration of the large driving wheels, the centre line of the boiler is 3 170 mm. (10 ft.

(*) The firm of Henschel built a 4-4-4 three-cylinder locomotive for the Prussian State Railways, in 1904, which reached a maximum speed of 144 km. (89.4 miles) an hour hauling a train of 160 tons; and the Bavarian State Railway showed a similar locomotive at the Nuremberg Exhibition in 1906.

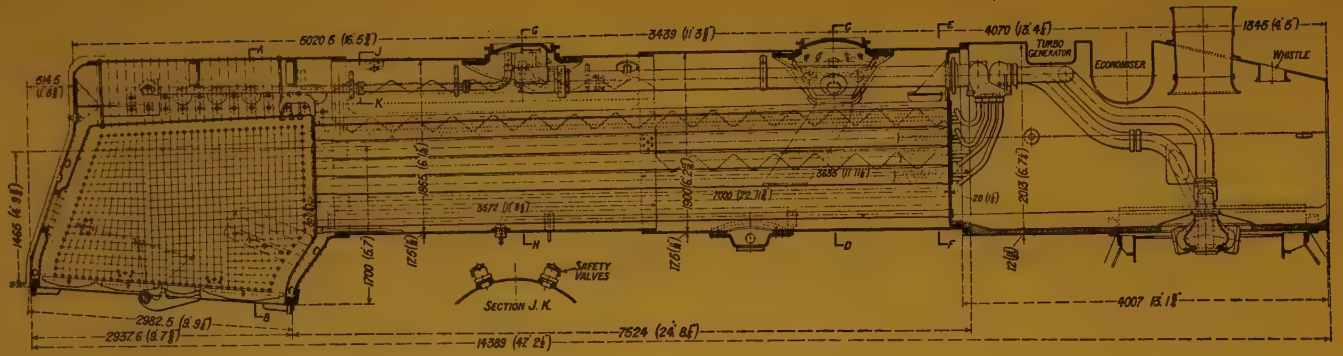
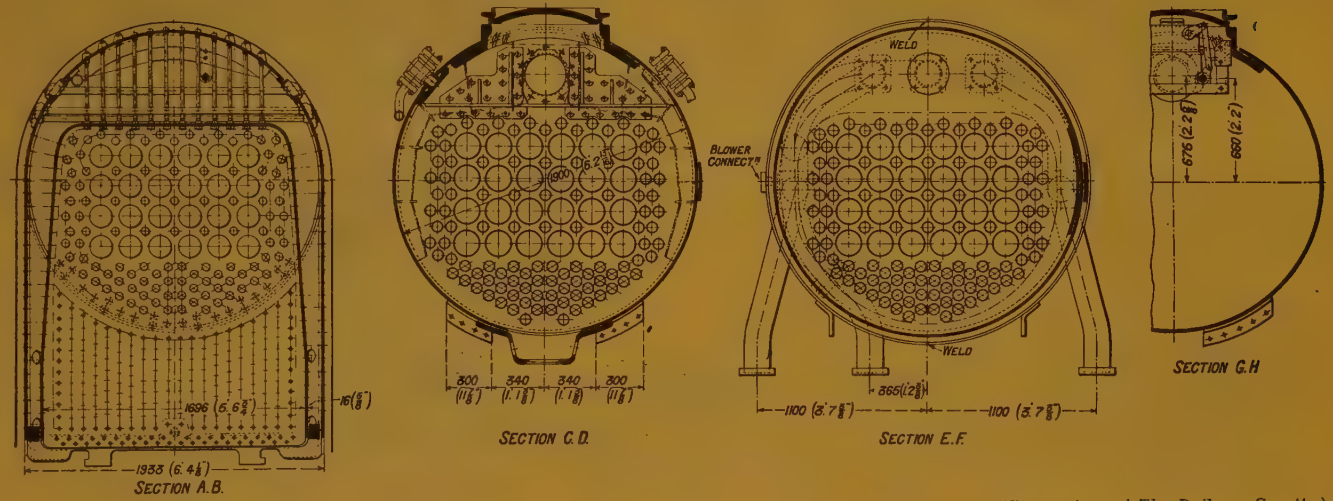
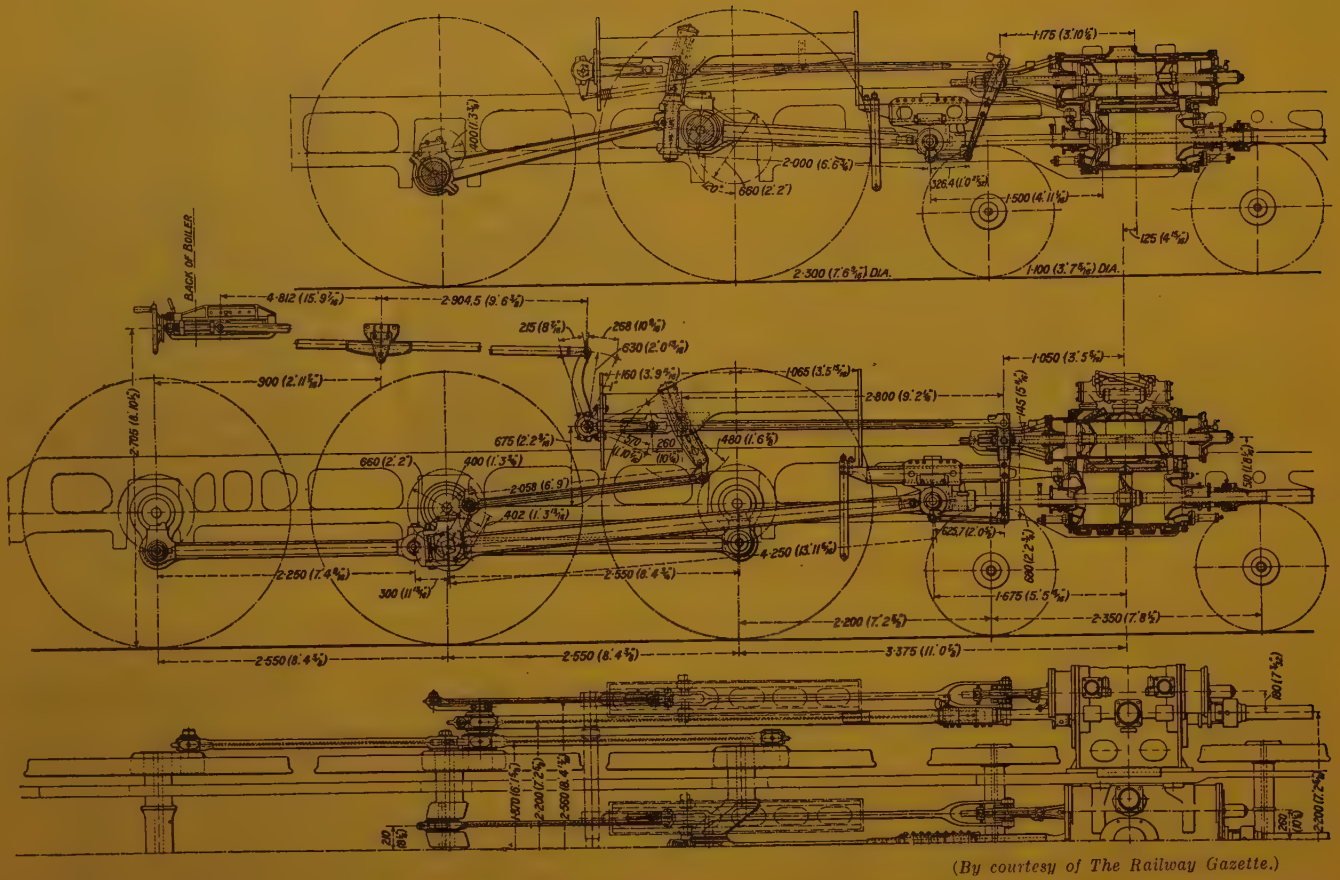


Fig. 2. — Longitudinal section through firebox, boiler and smokebox.



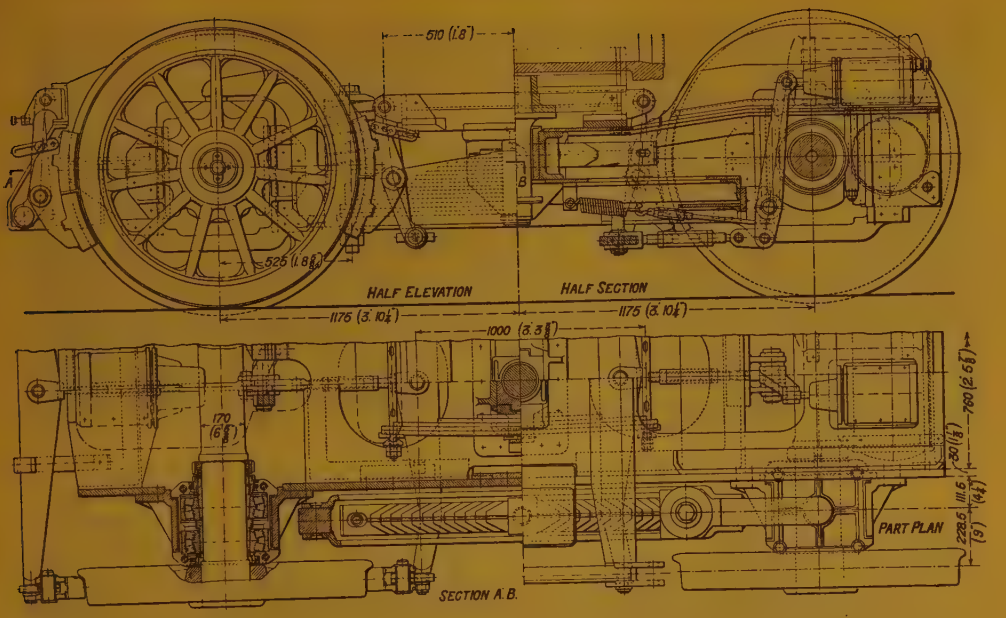
(*By courtesy of The Railway Gazette.*)

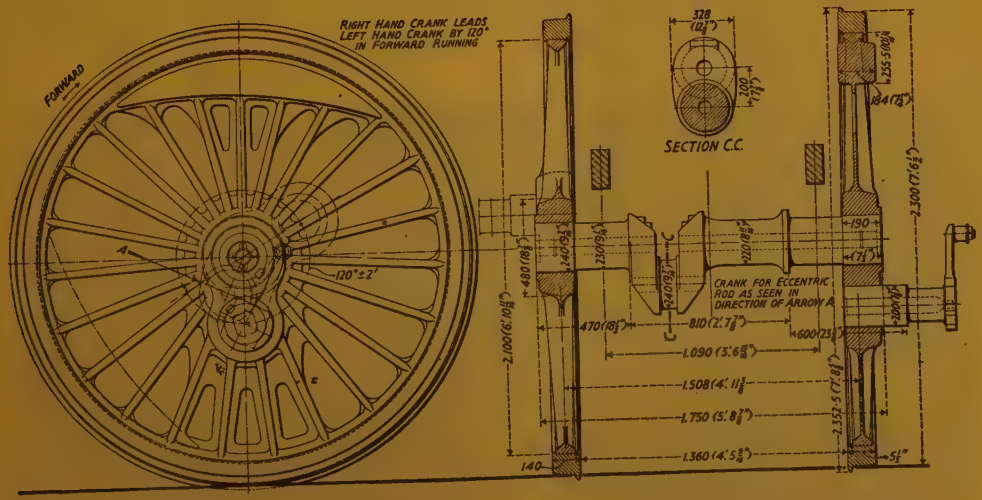
Fig. 3. — Cross sections through firebox and boiler.



(By courtesy of The Railway Gazette.)

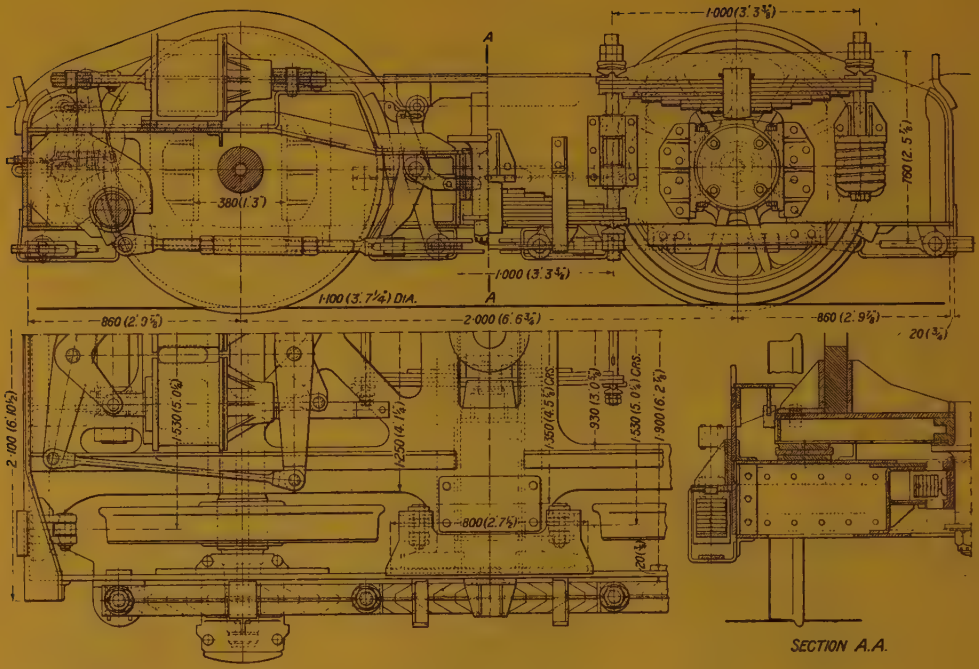
Fig. 4 (*above*). — Sections showing inside (top) and outside cylinders and motion.
Fig. 5 (*below*). — Part plan of cylinders and motion.

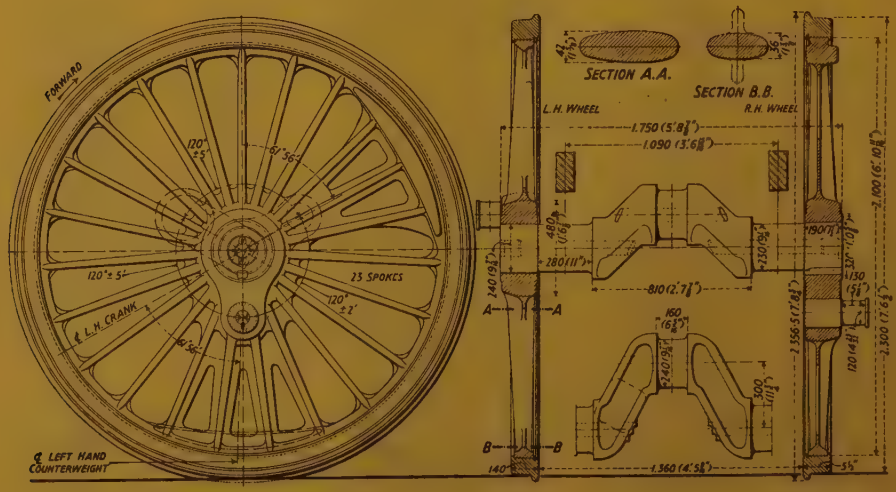




(By courtesy of The Railway Gazette.)

Fig. 6 (*above*). — Part elevation, sections and plan of leading bogie showing roller bearings.
Fig. 7 (*below*). — Elevation and sections of outside-drive coupled wheels and axle.





(*By courtesy of The Railway Gazette.*)

Fig. 8 (*above*). — Part elevation, sections and plan of trailing bogie.

Fig. 9 (*below*). — Elevation and sections of inside-drive coupled wheels and axle.

Fig. 10. — Placing the boiler on the frames.

Fig. 11. — Bar framing and cylinders.

Fig. 12. — View of motion with streamline casing in course of erection.

4 13/16 in.) above rail level, and it is therefore impossible to mount the steam dome in the usual way outside the boiler. Actually, as shown in the drawings figures 2 and 3, the base of the dome is riveted inside the boiler and the dome projects only slightly beyond the barrel.

The 24 flues of 163 mm./171 mm. (6.417 inch/6.731 inch) diameter, and 106 smoke tubes of 65 mm./70 mm.

Fig. 13. — Trailing bogie.

(2.559/2.756 inch) diameter have a total heating surface of 237.4 m² (2 554.4 sq. ft.) on the fire side. The length of tubes between tube plates is 7 m. (22 ft. 11 9/16 in.). The copper firebox, with a grate area of 4.7 m² (50.6 sq. ft.), has a heating surface of 18.6 m² (200.1 sq. ft.), so that the total steam-raising heating surface is 256 m² (2 754.5 sq. ft.) on the fire side. Each flue tube contains six superheater elements of 23 mm./29 mm. (0.905 in./1.141 in.) diameter and 90 m² (968.4 sq. ft.) heating surface. The total heating surface is thus about 346 m² (3 723 sq. ft.), apart from the exhaust-steam feedwater heater which has a heating surface of 13.4 m² (144.2 sq. ft.).

The water capacity of the boiler is 10.95 m³ (386.6 cu. ft.), the steam space 5.1 m³ (180 cu. ft.), and the steaming surface 5.6 m² (167.8 sq. ft.). The

Fig. 14. — Leading bogie.

Fig. 15. — The locomotive on a works trial run before being encased.

Fig. 16. — A view after encasing, with inspection doors and shutters open.

Fig. 17. — The new high-speed streamlined 4-6-4 locomotive ready for service.

designed steam output was about 15 000 kgr. (33 070 lb.) of steam per hour, and the indicated horse-power was expected to be 2 800 metric H.P. (2 764 H.P.). Two pop type safety valves are provided.

The firedoor is opened and closed by a small compressed air cylinder, which the fireman controls by a foot-operated valve. The arrangement of the ashpan offered special difficulties on account of the trailing bogie. In the form which was finally adopted, the parts were assembled by welding, and two pockets were provided on each side in order to improve the draught conditions.

Motion work, frames and wheels.

A three-cylinder drive was adopted to ensure the smoothest possible running. The expansion link of the inside cylinder is driven from the second coupled axle, and steam distribution to all cylinders is effected by 300-mm. (11 3/4 in.) diam. piston valves driven by Heusinger (Walschaerts) gear. The maximum valve travel is 180 mm. (7 1/16 in.). Weight is saved wherever possible in the construction of the locomotive and, in accordance with this, rods of I-section are used in the valve gear instead of the rectangular section generally employed.

At the time when this locomotive was ordered it was not considered advisable to adopt a boiler working pressure so high as 25 kgr. per cm² (355 lb. per sq. in.), for which a number of recent German locomotives have been designed. The pressure actually selected, viz., 20 kgr. per cm² (284 lb. per sq. in.) permits simple-expansion operation, and the choice of this pressure was further based on the assumption that compound working would offer no considerable advantages at such high speeds.

The bar frames are 90 mm. (3 9/16 in.) in thickness, connected by cross stays in the usual manner. Extensive use is made of welding in the construction of the stays. All carrying wheels, on both locomotive and tender, are fitted with pivoted roller bearings, the leading bogie wheel sets having inside, and the trailing bogie wheel sets outside bearings.

Tender.

The casing of the tender forms part of the general streamlining of the complete machine, and air resistance is further reduced by a vestibule connection to the first coach. The bunker is covered by three curved plates, the rear one being fixed and the other two arranged to slide over it when taking on coal. As

Fig. 18. — Erection of water tank on the frames.

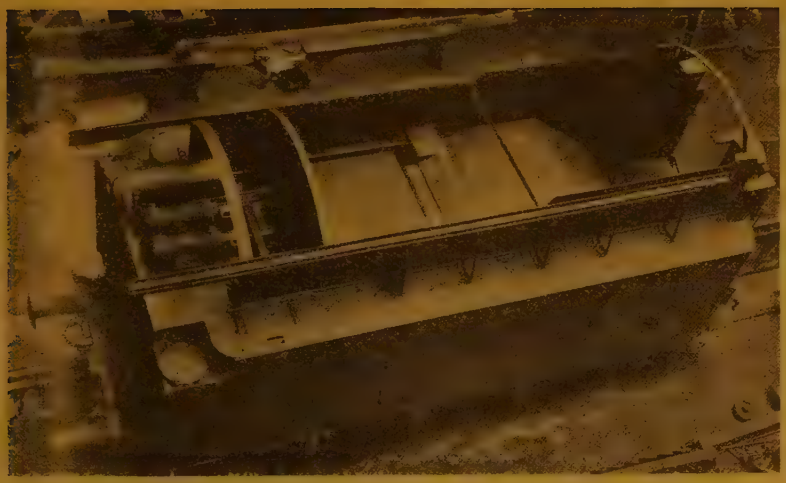


Fig. 19. — Tender as seen from above, before fitting stream-line casing, showing the two compressed-air cylinders for the coal pusher at the back, and the pusher itself on the bottom of the bunker.

the fireman cannot get at the coal to shovel it forward during running, two automatic pushers are provided, operated by compressed air cylinders. This device and the pneumatically operated firedoor previously mentioned, do much to lighten the fireman's duty.

Corresponding to the high boiler power, the tender has a water capacity of 37 m³ (8 140 Br. gallons), and a coal capacity of 10 metric tons (9 tons 17 cwt.). It is carried on ten wheels, the leading four being bogie-mounted, and the bearings for the other six being carried directly by the frames. The wheelbase of the bogie is 1 800 mm. (5 ft. 11 in.), the rigid wheelbase 2 650 mm. (8 ft. 8 1/4 in.) and the total wheelbase of the tender 5 900 mm. (19 ft. 4 1/4 in.).

The large diameter of the wheels (3 ft. 7 1/4 in.) necessitates a new method of mounting the tender frames on the water tanks so that they act also as the main longitudinal stiffeners of the latter. Numerous cross stays are, of course, provided to stiffen the tanks, and welding is used for all connections of the frames to the water tanks, as well as for the construction of the tanks themselves. The weight of the tender is 38.2 metric tons (37 Engl. tons 12 cwt.) empty, and 85.7 metric tons (84 tons 7 cwt.) in running order.

Brakes.

Special importance is attached to the provision of reliable quick-acting brakes. With the exception of the leading pair of carrying wheels on the locomotive, each wheel on locomotive and tender has two brake blocks. The leading wheels have single brake blocks, and whereas the braking is about 180 % of the axle load on all other axles, it is 50 % on the leading axle and 80 % on the trailing axle of the front bogie.

Automatic regulators are provided on the locomotive and tender to adjust the braking pressure according to the variations in brake friction with speed. In addition, the tender is fitted with a device which adjusts the braking to suit

the decreasing weight of coal and water in the bunker and tanks.

The brakes are capable of bringing the locomotive to rest from 175 km. (108.7 miles) an hour within the 1 000 m. (1 093 yards) allowed by the distant signal. Automatic train control gear is provided on the locomotive. The system of automatic train control most widely adopted in Germany is of the inductive type. It is so designed that, should a train over-run a stop signal, it will be brought to rest before it could collide with another train in the section. This necessitates the special braking referred to.

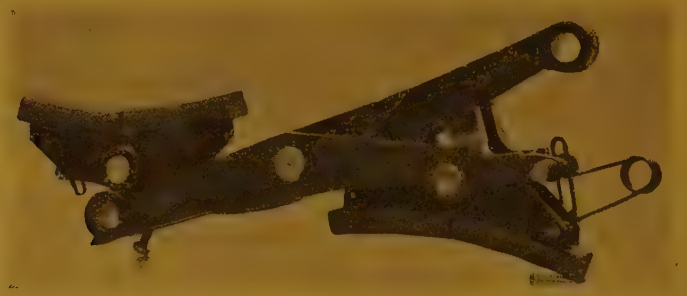


Fig. 20. — Brake hanger with two brake shoes.

[621. 43 & 662]

Diesel fuels and their selection,

by H. N. BASSETT, A. I. Mech. E.,
Chief Chemist, Egyptian State Railways.

(From *Diesel Railway Traction*, supplement to *The Railway Gazette.*)

The development of the diesel engine has been rapid, and within the last few years it has invaded fields of operation such as transport to an extraordinary extent. The rapid development of the diesel engine has followed upon much research, not only upon the engines, but also upon the fuels used. The ideal engine is one which will burn practically anything in the way of oil, and burn it effectively. This ideal, however, has not been attained yet, for many engines are still remarkably sensitive with regard to fuel.

At first sight it does not appear why two fuel oils which are substantially the same in all physical properties (viscosity, flash point, cold test, calorific value, etc.) should give quite different results when burnt in a compression ignition engine. The fuels which are readily obtainable in England do not differ so much, but experience overseas indicates strikingly different behaviour on the part of the various fuels available. Incomplete comprehension of the really vital points about a fuel oil has led in the past to the issue of specifications which have been unduly restrictive, and which have caused running costs to be unduly high in consequence.

The basis of the diesel engine is the combustion of the fuel by auto-ignition, and therefore it is obvious that a most

important point, perhaps the most important of all, is the temperature at which the oil will ignite, which is known as the spontaneous ignition temperature. This has no connection with the flash point of the fuel (which is the temperature at which the fuel gives off an inflammable vapour when tested under certain specified conditions), but there does appear to be a connection with the distillation range, which is also independent of the flash point very largely. From engine tests which have been made it appears that fuels which work well and with the minimum of knocking have a relatively flat distillation curve, and leave very little residue. There is also no great difference between the final boiling point and the spontaneous ignition temperature. Too much attention must not be paid, however, to the distillation curve, as this is usually obtained under atmospheric pressure, whereas in the engine cylinders the pressure is very much higher, and the curve may change its shape. In any event the final boiling point is raised, and may approach the spontaneous ignition temperature closely. If it should happen that the spontaneous ignition temperature was lower than the final boiling point under running conditions perfectly smooth running without a trace of knocking would result, as it would be impossible for vapour to collect in any quantity, since it would be burnt as fast as it was formed.

There are various laboratory methods of determining spontaneous ignition temperature, some of which use air alone, and others of which employ an oxygen stream, but it has been found that this figure alone is by no means all that is required in order to estimate the value of a diesel fuel, and that it is necessary also to know the delay period, *i.e.*, the time interval under running conditions between the commencement of injection and the beginning of rapid pressure rise. The longer this delay period the rougher is the running of the engine and the greater the combustion shock. If the ignition took place instantaneously the rate of pressure rise would be uniform, and would follow the rate of injection. As this does not happen there is a delay, and it takes for an engine under ordinary circumstances from 0.002 to 0.004 second to heat up the oil to its spontaneous ignition temperature. This delay allows fuel to accumulate in the cylinder, and in an engine running at 1 000 r.p.m., 0.002 second corresponds to 12 degrees of crank travel. If the injection is uniform over (say) 20 degrees, more than half the fuel charge accumulates, and ignites practically at one moment, causing a rapid pressure rise, and an audible knock. The longer the delay, the greater the accumulation of fuel and the steeper the rise in pressure and the louder the knock. It is the fuel delivered during the delay period which causes the knocking, as that delivered into the flame burns substantially without any lag at all as soon as it leaves the injection nozzle.

« Standard » fuel.

In making comparisons of different fuels it is necessary to adopt a standard fuel for reference purposes, and cetene has been selected as a high quality standard, and either mesitylene or alpha methylnaphthalene as the standard of low quality. The latter is generally used now as the standard low quality fuel owing to the high cost and low boiling point of mesitylene. Mixtures of cetene with one of the low quality standards can be made to match any fuel. Naturally these standard fuels are costly, and consequently when research of considerable magnitude is in progress an adequate supply of one or two standardised ordinary fuels is obtained and used.

It is possible therefore to refer to a fuel in terms of its « cetene number », which is the percentage of cetene in the blend of cetene with the standard low

quality fuel. This is comparable with the octane number of automobile fuels. For ordinary fuels such as are available commercially the cetene number ranges from 35 to 70, and high-speed engines may require a fuel with a cetene number of 60, or higher if the engine is particularly sensitive. Low-speed engines will work frequently on fuels with a cetene number as low as 35, or even lower.

The apparent effect of the distillation curve of the fuel on its behaviour in use has been mentioned. It appears that a much more important factor is the thermal stability of the molecules of the fuel, *i.e.*, their tendency to break down under the effect of heat in the engine. It is well to bear in mind that some engines have little peculiarities which appear to modify conditions appreciably. In one instance an engine was found to be running equally well on a wide variety of fuels, which should not have been the case from the theoretical point of view. When this was looked into it was found that combustion had apparently begun before injection had taken place, which indicated that combustion in the previous cycle had been incomplete, and that the unburnt fuel in some corner ignited during compression, and so caused the fresh charge to burn.

It is not always possible to carry out engine tests with fuels for purposes of comparison, and therefore a simple laboratory test which may be made without difficulty, and which gives results showing a degree of correspondence with cetene numbers as shown in engine tests is worth having. This is the determination of the temperature at which equal quantities of freshly distilled aniline and the fuel mix to give a clear solution. This is known as the aniline point, and is fairly satisfactory with diesel fuels of the usual kind. It fails with oils which have been doped, and with oils not of mineral origin, and is somewhat uncertain with shale oil and oils made from coal. The lower the aniline point the lower the cetene number. The relationship is not quite a straight line, but the curve is almost flat, and the test is useful for distinguishing quickly between fuels of good and bad quality.

Ignition delay.

Reference has been made to the significance of the delay in ignition of some fuels in connection with knocking. There are certain chemical compounds, popularly known as dopes, which can be added to the fuel, which have the effect of lessening the delay, and so reducing the knock. The way in which these dopes function has not been elucidated completely, but it has been suggested that they assist in the formation of unstable peroxides in the fuel, which have a lower spontaneous ignition temperature than the undoped fuel. Two dopes which have been used successfully are amyl nitrite and ethyl nitrate, but their efficiency is not sufficiently high, nor their cost low enough to make the doping of fuels as a regular thing an economical practice. Tetraethyl lead, which is a regular dope for ordinary petrols, considerably increases the knocking when it is put into diesel fuels. The reduction in delay angle with 2 % of dope is of the order of 25—35 % according to the quality of the fuel, the bigger reduction being obtained with the poorer fuel. The effect is more pronounced when the dope is used in vapour form in the engine inlet and not mixed with the fuel.

The viscosity of diesel fuel is a matter of importance, and though not so vital as the spontaneous ignition temperature, must be considered, for the manner in which the oil behaves before combustion depends upon this property. Sometimes an oil is so viscous that it is necessary to preheat it before it goes to the engine, and this represents an addi-

tional cost which should be saved if possible.

The amount of energy required properly to atomise the oil at the moment of injection depends directly upon the viscosity, and in air injection engines by increasing the pressure of the air and the amount injected, relatively heavy oils can be used. This is not the case with airless-injection engines, however, for it will be found that simply by increasing the injection pressure satisfactory atomisation is not obtained. With increased viscosity the diameter of the drops increases considerably, and though the drops are reduced again in size by the effect of largely increased pressure, trebling the pressure only halves the diameter of the drops. For good combustion perfect atomisation must be had which means selection of fuel of the correct viscosity. High viscosity, leading to larger drop size, means lengthening the delay period as the larger drop takes longer to heat up to the ignition temperature. This in its turn means a certain amount of increase in the combustion noise.

A minor detail, but nevertheless an important one, is that high viscosity oils tend to collect mineral matter between the refinery and the engine to a much greater degree than less viscous ones, and as this matter is always abrasive and is not always easy to remove, wear tends to become heavy on cylinder linings and rings.

Closely connected with the viscosity is another property known as the pour point, which is the temperature at which the oil ceases to flow when tested under certain closely specified conditions. It corresponds, in some cases, with the separation of amorphous wax, which tends to clog the fuel filters and to interfere with proper feeding of the oil. A low pour point is desirable, therefore, as even if the temperature never falls so low as to cause separation of solid matter in the oil the viscosity always increases very much in the neighbourhood of the pour point, and as has been seen already, high viscosity tends to difficulties in running.

Ash contents and deposits.

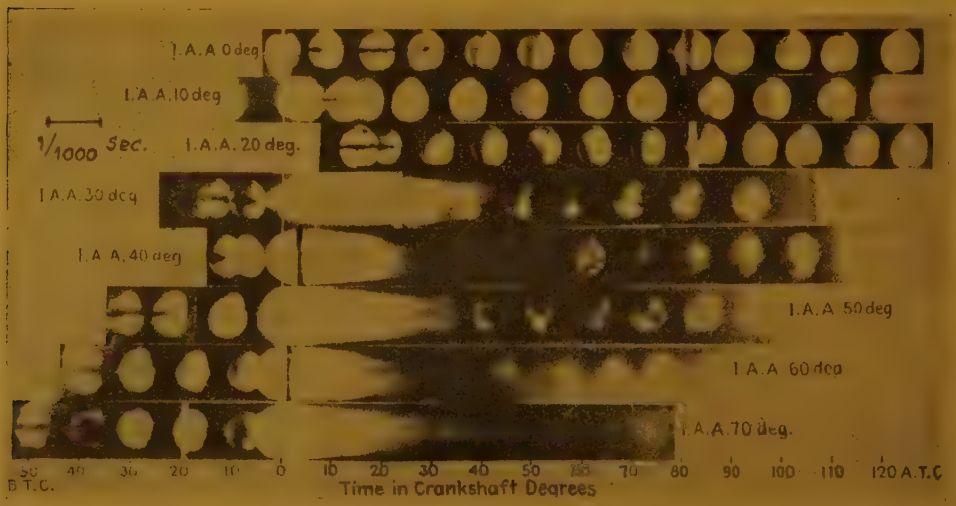
Diesel fuels vary considerably in their hard asphalt content, and the amount which may be permitted in any oil depends upon the type of engine in which the fuel is to be burnt. Large engines will burn oils with 2 % of hard asphalt or more without difficulty in some cases, but small high-speed engines will not deal successfully with oils containing much smaller quantities.

In airless injection engines highly asphaltic oils form deposits round the nozzles which burn out to form an adherent mass of coke, and this becomes incandescent and leads to trouble with the combustion of the fuel. Taking everything into consideration, carbon deposits are not so troublesome in diesel engines as in petrol engines, but inasmuch as hard asphalt is certainly a contributory cause it is well to restrict it in the fuel as far as possible. Fuels which have heavy ends (*i.e.*, a somewhat protracted distillation range with a high end point) leave sticky deposits when the engine is running on light loads, and deposits are usually heavier when the engine spends a good deal of time idling or running under light load only.

Examination of deposits shows usually a considerable proportion of iron, which comes mainly from the liners and rings. A certain amount of wear is inevitable, but in some cases it is excessive because of the mineral matter in the fuel. Reference has been made already to the adventitious matter which finds its way into the oil between the refinery and the engine. There is also what may be termed inherent ash, which is present in the oil when prepared, which is extremely finely divided and very difficult to separate. Unfortunately this ash is very abrasive and causes rapid

wear. Some control of the wear may be effected by watching the composition of the iron used for liners and piston rings, but the main factor is the ash in the fuel. Wear takes place rapidly at first, but once the walls have acquired polish further wear should be extremely small. That it is not so is due, nine times out of ten, to the ash of the fuel. Comparisons should only be made between fuels working under identical conditions, and at least 1 000 hours should be allowed for the preliminary wearing-in-period, in which the wear may be four or five times as much as in succeeding 1 000-hour periods. Fuel containing no more than 0.1 % of ash may cause twenty times as much wear per 1 000 hours as another fuel containing less than 0.01 % and even a lower content than the latter may lead to severe wear. There is a tendency not to appreciate the importance of small amounts of mineral matter in fuel oil. This was made clear in one instance when the port engine of a tanker was run for purposes of comparison on boiler fuel, whilst the starboard engine was worked on gas oil under the same conditions precisely. The wear in the port engine was nearly six times as much as that in the starboard engine after 1 000 hours' operation.

The removal of the inherent ash is a difficult matter, and there is only one method by means of which it can be removed absolutely completely, and that is the use of the streamline filter. High speed centrifugal machines will remove the greater part of it, but not the last traces, and if a streamline filter can be installed its cost will be saved in a comparatively short time by the saving in rings and liners. Actually, the oil companies should do this, and then all that the user need instal is a centrifugal machine to remove the adventitious matter which has found its way into the oil since leaving the refinery. The necessity of filtering the oil before in-



Evaporation and combustion of fuel oil in engine running at 1 500 r.p.m. This diagram is due to Rothrock and Waldron (N. A. C. A. Report 45, 1932). I. A. A. is injection advance angle.

jection, either by means of a centrifugal machine or by means of a streamline filter cannot be too strongly stressed.

The permissible sulphur content of diesel fuels is a controversial question on which agreement is far from being reached, as is indicated by the widely varying proportions of sulphur shown as allowable in the specifications which have been published. The British Standard Specification (No. 209 of 1924) does not mention sulphur at all, as its importance at that time was not considered sufficient to warrant mention. American specifications issued in 1929 allowed 3 % by weight of sulphur in oil for heavy-duty engines, and 2 % in oil for high-speed engines. Russian specifications slightly earlier in date (1927) gave a maximum figure for sulphur of 0.5 %, and a tentative specification for fuel oil issued in 1932 for the A. E. C. engine used in L. G. O. C. buses and in the G. W. R. railcars gave a limit of 0.05 %.

The obvious reason for limiting the sulphur content is because of the corrosive nature of the gases formed during combustion, but these gases (sulphur dioxide and sulphur trioxide) are corrosive only when moist, and under the conditions of operation of a diesel engine the exhaust gases remain dry until well away from the cylinder. At the end of a long exhaust system they may have cooled enough to act corrosively, but that is unlikely, and therefore this particular aspect of the question can be passed over.

There is the possibility of corrosion of the gudgeon pins of the pistons, such as takes place with automobile engines. The conditions are quite different with diesel engines, however. Corrosion in an automobile engine is due to the accumulation of acids in the crankcase, not necessarily sulphur acids (though in some instances sulphur acids have been found), but definitely acid bodies derived in the main from the fuel which collect there because of dilution of the lubricating oil by fuel tailings. Dilution of crankcase oil does not occur to anything like the same extent with most diesel engines, and therefore such corrosion can hardly be expected to take place.

The sulphur is present in the oil mainly in the form of certain evil-smelling compounds, and hence there is perhaps some justification for insisting on a low sulphur content in fuel for engines in public service vehicles, because the smell which arises from the exhaust is due almost wholly to unburnt fuel. Experiments have shown that there was little difference in smell noticeable in the exhaust from an engine which was run on fuels of widely varying sulphur content, which suggests that sulphur content is not really so important in this direction as has been thought to be the case.

It must not be expected that what obtains in the petrol engine will hold good for the diesel. Two examples will suffice to illustrate the point. Aromatic fuels, such as benzol, are among the very best for petrol engines, but they give the worst results with compression ignition engines, and benzol will not burn at all. Among the dopes available, tetraethyl lead is a most effective anti-knock for petrol engines, but with diesel units it actually increases the knock instead of diminishing it.

That there is room for considerable extension of our knowledge of fuel oil, is made evident from a study of the specifications which have been published up to the present, in which there are extremely divergent requirements in certain properties. In the following table are given specifications which are put forward as indicating the kind of oil which may be expected to give good service, without prejudice to the fact that other oils which do not meet the requirements shown in every particular may be satisfactory also in some engines.

	Heavy duty, 450 to 650 r.p.m.	Light duty, 750 to 2 500 r.p.m
Viscosity, Redwood, at 1 000° F. . .	Below 150 seconds	35 to 65 seconds.
Sulphur, max. . . . . %	0.5	0.5
Hard asphalt, max. . . . . »	1.0	0.5
Ash, max. . . . . »	0.01	0.01
Water, max. . . . . »	0.5	0.05
Flash point, closed test	Not below 150° F .	Not below 150° F.
Spontaneous ignition temperature .	As low as possible	As low as possible.
Pour test (A. S. T. M. method) . .	Liquid at 20° F.	Liquid at 20° F.

The spontaneous ignition temperature of the fuel depends upon the type of apparatus used in making the test, and as none of those available can be regarded as having reached its final form, it is hardly possible to single out one type rather than another and to label it as standard. Inasmuch as different crudes yield fuels of varying distillation ranges, to specify a distillation range would mean the limitation of the supply to one crude. Furthermore, as the value of the fuel is only indirectly related to the distillation range, and is more dependent upon the chemical characteristics of the fraction (which affect the thermal stability of the fuel), to delimit the range might cut out quite good fuels unnecessarily.

[313 : 625. 143. 3]

Statistics of rail breakages for the years 1933-1934.

We publish hereafter, in the form adopted at the Madrid Congress (1930) (1), the information supplied by member Administrations in connection with the rail fractures which occurred on their lines during the combined years **1933 and 1934.**

In the tables hereafter, and unless stated otherwise (2) :

Light rails *applies to rails of a weight less than 85 lb. per yard (42.5 kgr. per metre),*

Medium rails, *to rails of 85 to 105 lb. per yard (42.5 to 52.5 kgr. per metre),*

Heavy rails, *to those weighing 106 lb. per yard (53 kgr. per metre) or over.*

---

(1) See *Bulletin of the Railway Congress,* December 1930, pp. 2236, 2240-2242.
(2) See *Bulletin of the Railway Congress,* March 1926, p. 240.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
GERMANY. **Deutsche Reichsbahn Gesellschaft.**																			
C. The whole of the rails (*) *Light*	28	12 311	1.4	157	7 182	16.2	285	6 471	27.4	408	13 031	19.5	1209	15 390	48.8	2117	54 385	24.2	
The whole of the rails (*) *Medium*	181	12 758	8.8	81	14 363	3.5	9	4 423	1.3	7	2 457	1.8	73	8 118	5.6	351	42 119	5.2	24.6
Total . . .	209	25 069	5.2	268	21 545	7.7	294	10 894	16.8	415	15 488	16.6	1282	23 508	33.9	2468	96 504	15.9	

Number of { train-miles : 810 765 000. / English ton-miles : 260 619 268 000.

Number of fractures { total : 2 468. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 18.9. / per 1 billion tkm. or 612 000 000 English ton-miles : 5.8.

	Percentage of fractures in the part: covered by the fishplates.	Percentage of fractures in the part: clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	on curves of ≤ 800 m. (40 chains) radius: Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100).	on a rising or falling gradient: > 10 mm. per m. (1 in 100).
D *Light rails*	66 %	34 %	...	...	...	...	...
Medium rails	55 %	45 %	...	...	...	...	...

(*) So far, no detailed records have been kept, on the Deutsche Reichsbahn, in connection with rail breakages in tunnels, on curves of a radius below 40 chains, or on gradients steeper than 1 in 100.

Likewise there are no particulars regarding the aspect of the fractures (E).

AGE OF RAILS:

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
ARGENTINE. Buenos-Ayres & Pacific-Railway.(*)																			
A. Rails outside tunnels. *Light*	...	...	...	2	1 093.3	1.14	...	...	...	...	...	...	55	1 093.3	31.44	57	1 093.3	32.58	18.3
A. Rails outside tunnels. *Medium*	...	...	...	4	1 946.2	1.28	...	...	...	...	...	...	13	1 946.2	4.17	17	1 946.2	5.46	21.6
Total . . .	...	...	...	6	3 039.5	1.23	...	...	...	...	...	...	68	3 039.5	13.98	74	3 039.5	15.21	

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius.		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
			on the level				
D. *Light rails* . .	61.4 %	38.6 %	53	3	1	57	...
D. *Medium rails* .	35.3 %	64.7 %	17	...	...	16	1
Total . . .			70	3	1	73	1

	Light rails.	*Medium rails.*
E. — *a*) New clean fractures { with internal transverse fissure	...	1
E. — *a*) New clean fractures { without internal transverse fissure	57	16
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head { in the foot	25	6
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head { in the head	7	8
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head { in the web	25	3
d) Number of pieces rails are broken into	2 and 3	2 and 3

Notes. — (1) Light rails, 50.4—74.6 lb. per yard. — Medium rails, 85—100 lb. per yard.
(2) There are no tunnels on the System.

(*) In running lines only.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS. Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Buenos-Ayres Great Southern Ry.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light* (*).	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	19.25
A. Rails outside tunnels. *Medium* .	24	205.5	121.6	25	512.25	30.5	51	252.25	126.3	43	113.5	235.9	81	2964.25	17	224	4047.75	34.5	19.25

B. Rails in tunnels. — No tracks in tunnels.

Number of train-miles : 13 011 944. Number of fractures { total / per 10 000 000 tr.-km. or 6 250 000 train-miles / per 1 billion t.-km. or 612 000 000 English ton-miles } Not compilable owing to information re-light rails being missing.

(*) Information not available.

	Percentage of fractures in the part: covered by the fishplates.	clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails.* .	(*)	(*)	(*)	(*)	(*)	Not available.	
D. *Medium rails.* .	58.4	41.6	190	34			
Miles of single track of each class.			602.75	4 749			

		Light rails.	*Medium rails.*
E. *a*) New clean fractures . . .	with internal transverse fissure	Information not available.	
	without internal transverse fissure		
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot		
	in the head		
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . .	in the web		

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Buenos-Ayres Western Railway.																			
A Rails outside tunnels. *Light.*	...	49.8	...	...	1.8	...	...	1.8	...	...	44.5	...	53	1 559.9	21	53	1 657.8	20	19.0
A Rails outside tunnels. *Medium*	4	43.5	57	23	52.8	272	4	59.0	43	7	236.1	19	3	15.5	120	41	406.9	90	19.0
Total	4	93.3	26	23	54.6	272	4	60.8	43	7	280.6	15	56	1 575.4	22	94	2 064.7	30	
B. Rails in tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
B. Rails in tunnels. *Medium*	...	...	...	...	...	...	...	...	...	5	1.2	2 600	...	...	...	5	1.2	2 600	
Total	...	...	...	...	...	...	...	...	...	5	1.2	2 600	...	...	...	5	1.2	2 600	
C. The whole of A and B. *Light*	...	49.8	...	...	1.8	...	...	1.8	...	...	44.5	...	53	1 559.9	21	53	1 657.8	20	
C. The whole of A and B. *Medium*	4	43.5	57	23	52.8	272	4	59.0	43	12	237.3	31	3	15.5	120	46	408.1	90	
Total	4	93.3	26	23	54.6	272	4	60.8	40	12	281.8	26	56	1 575.4	22	99	2 065.9	29.7	

Number of train-miles : 10 764 850.

Number of fractures { total : 99. per 10 000 000 tr.-km. or 6 250 000 train-miles : 54.26.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	on curves of ⩽ 800 m. (40 chains) radius: Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D. *Light rails*	29 %	42 %	53	...	...	...	23
D. *Medium rails*	18 %	11 %	43	3	...	2	35
Total			96	3	...	2	58
Miles of single track of each class.			2 064.9	1.0		...	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ferrocarril Central Argentino.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	22	246.0	56	22	246.0	56	
A. Rails outside tunnels. *Medium*	16	703.5	14	20	671.5	19	4	334.4	7.5	8	80.6	62	44	2 015.2	13.5	92	3 805.2	15	...
Total . . .	16	703.5	14	20	671.5	19	4	334.4	7.5	8	80.6	62	66	2 261.2	18	114	4 051.2	17.5	

	Percentage of fractures in the part covered by the fishplates.	Percentage of fractures in the part clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	on curves of ⩽ 800 m. (40 chains) radius: Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D. *Light rails* . .	60 %	40 %	...	...	...	...	...
D. *Medium rails* .	36 %	64 %	...	...	...	...	...
Total . . .			...	...	...	...	...
Miles of single track of each class.			...	...		...	...

Names of Administrations and description of rails.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			Total.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
AUSTRIA. Federal Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	...	2.7	...	1	55.4	11.22	10	66.9	92.97	19	172 4	68.48	279	2 128.2	81.45	309	2 425.6	79.15	
A. Rails outside tunnels. *Medium*	2	361.1	3.44	17	527.0	20.05	19	182 7	64.59	16	178.7	55 63	95	731.1	80.75	149	1 980.6	46.71	
Total	2	363.8	3.42	18	582.4	19.21	29	249.6	72.18	35	351.1	61.94	374	2 859.3	81.27	458	4 406.2	64.59	
B. Rails in tunnels. *Light*	...	1.1	...	...	2.4	...	1	2.0	317.16	1	2.4	256.40	...	9.1	...	2	17.0	73.30	
B. Rails in tunnels. *Medium*	...	5.5	...	3	34.7	53.62	10	10.2	60.63	5	3.0	1 026.90	8	4.6	1 090 51	26	58 0	278.19	
Total	...	6.6	...	3	37.1	50.18	11	12.2	55.98	6	5.4	684.07	8	13.7	363 63	28	75.0	231.88	
C. The whole of A and B. *Light*	...	3.8	...	1	57.8	10.75	11	68.9	99.35	20	174.8	70.97	279	2 137.3	81.10	311	2 442.6	78.86	15.8
C. The whole of A and B. *Medium*	2	366.6	3.31	20	561.7	22.13	29	192.9	93.67	21	181.7	71.80	103	735.7	87.17	175	2 038.6	53.34	18.7
Total	2	370.4	3.36	21	619.5	21.06	40	261.8	94.93	41	356.5	71.45	382	2 873.0	82.61	486	4 481.2	67.39	

Number of { train-miles : 59 580 050. / English ton-miles : 19 178 334 000.

Number of fractures { total : 486. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 50.69. / per 1 billion ton.-km. or 612 000 000 English ton-miles : 15.50.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails*	66.6 %	33 44 %	203	55	53	246	59
D. *Medium rails*	77.7 %	22.3 %	115	38	22	143	38
Total			318	93	75	389	97
Miles of single track of each class.			Information not available.				

		Light rails.		*Medium rails.*	
E. *a)* New clean fractures	with internal transverse fissure		14		...
	without internal transverse fissure		61		37
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot		55		18
	in the head	306 *)	54	180 *)	28
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web		94		64
d) Number of pieces rails are broken into	264×2, 9×3, 4×4, 1×5 pieces		28 **)	132×2, 10×3, 5×4 pieces	33 **)
	28×0 (cracked)			33×0 (cracked)	

(*) Of which :
(**) Not completely severed (cracks in foot or web).

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 years and over. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
BELGIUM.		Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Belgian National Railways Company.																
A Rails outside tunnels.																
Light: 76.6 and 81.9 lb.	...	...	...	4	247.5	10.05	6	400.3	9 31	31	1 391.4	13.84	41	2 039.2	12.49	
Medium: 100.8 and 104.8 lb.	5	2 333.1	1.33	120	2 509.7	29.71	118	1 137.7	64.44	117	354.3	205.18	360	6 334.8	35.31	
Heavy: 114.9 lb.	...	...	...	...	...	...	...	...	...	11	279.0	24.52	11	279.0	24.52	
Total . . .	5	2 333.1	1.33	124	2 757.2	27.94	124	1 538.0	50.10	159	2 024.7	48.80	412	8 653.0	29.58	
B. Rails in tunnels.																23.390
Light: 76.6 and 81.9 lb.	...	...	...	...	...	...	...	...	...	...	1.0	...	...	1.0	...	
Medium: 100.8 and 104.8 lb.	...	35.2	...	6	25.5	145.80	...	0.2	...	1	2.9	216.64	7	63.8	67.85	
Heavy: 114.9 lb.	...	...	...	...	...	...	...	...	...	...	0.5	...	...	0.5	...	
Total . . .	...	35.2	...	6	25 5	145.80	...	0.2	...	1	4.4	142.29	7	65.3	66.31	
C. The whole of A and B.																
Light: 76.6 and 81.9 lb.	...	...	...	4	247.5	10.05	6	400.3	9.31	31	1 392.4	13.83	41	2 040.2	12.48	
Medium: 100.8 and 104.8 lb.	5	2 368.3	1.312	126	2 535.2	30.88	118	1 137.9	64.43	118	357.2	205.27	367	6 398.6	35.63	
Heavy: 114.9 lb.	...	...	...	...	...	...	...	...	...	11	279.5	24.48	11	279.5	24.48	
Total . . .	5	2 368.3	1.312	130	2 782.7	29.02	124	1 538.2	50.08	160	2 029.1	49.00	419	8 718.3	29.86	

Number of { train-miles : 90 622 350. / English ton-miles : 28 138 392 000.

Number of fractures { total : 419. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 28.75. / per 1 billion tkm. or 612 000 000 English ton-miles : 9.1.

	Percentage of fractures in the part: covered by the fishplates.	clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails* . .	18 = 43.90 %	23 = 56.10 %	33	8	...	4	3
Medium rails .	325 = 88 55 %	42 = 11.45 %	329	28	10	165	30
Heavy rails . .	9 = 81.81 %	2 = 18.19 %	11	...	...	6	4
Total . . .			373	36	10	175	37
Miles of single track of each class.			7 213.3	1 505.0		5 482.6	1 396.2

		Light.	*Medium*	*Heavy.*
E. *a*) New clean fractures	with internal transverse fissure	10	26	1
	without internal transverse fissure	5	95	5
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head		26	246	5

Note. — The above table only shows the mileages of single track laid with rails of Belgian standard sections.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			Total of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Nord Railway (Belgian Lines).		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	...	..	...	3.9	...	...	7.9	...	...	11.8	...	19.7
Medium	1	28.8	22	2	90.5	14	1	8.8	70	...	...	...	4	57.4	43	8	185.5	27	
Heavy	...	...	...	...	...	...	...	...	...	...	...	...	...	1.4	...	...	1.4	...	
Total	1	28.8	22	2	90.5	14	1	8.8	70	..	3.9	...	4	66.7	37	8	198.7	25	
B. Rails in tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Medium	...	0.4	...	1	1.7	356	...	...	...	...	...	...	...	0.3	...	1	2.4	254	
Heavy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Total	...	0.4	...	1	1.7	356	..	...	...	...	...	...	...	0.3	...	1	2.4	254	
C. The whole of A and B. *Light*	...	...	...	...	...	...	...	...	...	...	3.9	...	...	7.9	...	...	11.8	...	
Medium	1	29.2	21	3	91.2	20	1	8.8	70	...	...	...	4	57.7	43	9	187.9	29	
Heavy	...	...	...	...	...	...	...	...	...	...	...	...	...	1.4	...	...	1.4	...	
Total	1	29.2	21	3	91 2	20	1	8.8	70	...	3.9	...	4	67.0	37	9	201.1	28	

Number of { train-miles : 4 185 600. / English ton-miles : 548 963 150.

Number of fractures { total : 9, / per 10 000 000 tr.-km. or 6 250 000 train-miles : 13. / per 1 billion tkm. or 612 000 000 English ton-miles : 10.

	Percentage of fractures in the part		NUMBER OF FRACTURES :				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails*	...	...	...	...	...	...	...
Medium rails	88.89 %	11.11 %	3	4	2	8	1
Heavy rails	...	...	...	...	...	...	...
Total			3	4	2	8	1
Miles of single track of each class.			159.7	41.6		196.0	5.3

		Light rails.	*Medium rails.*
E. *a*) New clean fractures	with internal transverse fissure	...	2 (1)
	without internal transverse fissure	...	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	...	2 (2)
	in the head	...	3 (3)
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	...	2 (4)

d) Number of pieces rails are broken into : 2, except 3 pieses for 1 of the rails marked (1) and (2), and 1 of the 3 rails marked (3); 4 pieces for 1 of the 2 rails marked (4).

(2) One of these rails showed a much rusted old fracture extending to the outer surface of both the foot and the head.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Belgian National Light Railways Company.																			
A. Rails outside tunnels. *Light*	...	...	...	11	...	...	36	...	...	54	...	...	1455	...	...	1556	...	...	9.8
A. Rails outside tunnels. *Medium*	...	...	...	9	...	...	47	...	...	26	...	...	98	...	...	180	...	...	
Total . . .	...	...	...	20	...	...	83	...	...	80	...	...	1553	...	...	1736	...	...	

Length of system worked : 2 933 miles.

Number of { train-miles : 66 851 350. / English ton-miles : 10 340 350 000.

Number of fractures { total : 1 736. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 161. / per 1 billion tkm. or 612 000 000 English ton-miles : 102.61.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D *Light rails* . .	450	1 106	341	1 215	...	1 380	176
D *Medium rails* .	24	156	25	...	155	161	19
Total . . .			376	1 215	155	1 541	195

AGE OF RAILS:

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			The whole of the rails.			*Maximum axle load.*
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CONGO COLONY.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles		English tons.
Chemin de fer du Bas-Congo au Katanga (B.C.K.)																			
Bukama-Sakania (C.F.K.) 568.6 miles.																			
Port-Francqui-Bukama (L.K.D.) 727 miles, and																			
Tenke-Dilolo (L.K.D.) 338.7 miles.																			
A. Rails outside tunnels.																			
Light:																			
29.3 kgr. (59.2 lb.)	...	338.7	...	7	845.1	5	...	...	...	2	202.0	6	10	240.5	25	19	1 634.3	7	14.8

Number of { train-miles : 2 103 380. / Engl. ton-miles : 660 952 700.

Number of fractures { total : 19. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 57. / per 1 billion tkm. or 612 000 000 Engl. gross ton-miles : 18.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails* . . .	5.26 %	94.74 %	5	8	6	7	12

	Light rails.
E — *a*) New clean fractures { with internal transverse fissure	1
{ without internal transverse fissure	4
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head { in the foot	2
{ in the head	11
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head { in the web	1
d) Number of pieces rails are broken into	12×2 / 7×1

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Chemin de fer du Congo.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels :																			
Light	...	169.6	...	...	60.3	...	...	...	...	...	...	...	...	12.4	...	...	242.3	...	14.8

Number of train-miles : 1 019 360.

Number of English ton-miles : 322 407 770.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
BULGARIA. State Railways. (*)		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels :																			
Light	13	572.9	14	16	351.7	28	3	442.4	4	25	166.5	93	33	1 859.2	18	110	3 392.7	20	16.8

Number of { train-miles : 13 828 000. / English ton-miles : 3 136 930 000.

Number of fractures { total : 110. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 49.32. / per 1 milliard tkm. or 612 000 000 English ton-miles : 21.74.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails* . . .	24.54 %	75.46 %	79	17	14	72	38
	Miles of single track of each class.		2 512.9	879.8		2 467.5	925.2

		Light rails.
E. *a)* New clean fractures	with internal transverse fissure	22
	without internal transverse fissure	25
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	26
	in the head	22
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	15
d) Number of pieces rails are broken into		...

(*) Standard-gauge.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DENMARK. State Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	...	90.2	...	...	124.7	...	8	152.9	32.6	6	137.1	27.2	146	669.6	136.0	160	1 174.5	84.6	15.7
Medium	...	160.7	...	...	106.2	...	3	168 4	11 0	3	45.4	40 8	10	238.6	26.0	16	719.3	13.8	19.7
Total	...	250.9	...	...	230.9	...	11	321.3	21.2	9	182.5	30.4	156	908.2	105.2	176	1 893.8	57.6	
B. Rails in tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Medium	...	...	...	...	...	...	...	...	...	2	3.7	334 0	...	...	...	2	3.7	334.0	
Total	...	...	...	...	...	...	...	...	...	2	3.7	334.0	...	...	...	2	3.7	334.0	
C. The whole of A and B. *Light*	...	90.2	...	...	124.7	...	8	152.9	32.6	6	137.1	27.2	146	669.6	136.0	160	1 174.5	84.6	
Medium	...	160.7	...	...	106 2	...	3	168.4	11.0	5	49.1	63.0	10	238.6	26.0	18	723·0	15.4	
Total	...	250.9	...	...	230.9	...	11	321.3	21.2	11	186.2	36.6	156	908.2	105.2	178	1 897.5	58.4	

Number of { train-miles : 29 377 570. / English ton-miles : 6 012 436 800.

Number of fractures { total : 178. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 38. / per 1 billion tkm. or 612 000 000 English ton-miles : 18.

	Percentage of fractures in the part: covered by the fishplates.	Percentage of fractures in the part: clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	on curves of ⩽ 800 m. (40 chains) radius: Higher rail.	on a rising or falling gradient: ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient: > 10 mm. per m. (1 in 100).
D. *Light rails*	78 %	22 %	...	...	...	...	...
Medium rails	78 %	22 %	...	...	...	...	...

E.			*Light rails.*	*Medium rails.*
a) New clean fractures	with internal transverse fissure		2	...
	without internal transverse fissure		42	5
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot		22	6
	in the head		8	3
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web		86	4
d) Number of pieces rails are broken into		2 pieces	134	14
		3 —	24	2
		73 —	2	2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
EGYPT. State Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	49.1	...	15	699.1	13.33	15	748.2	12.46	18.8
A. Rails outside tunnels. *Medium*	12	193.9	38.46	5	473.5	6.56	3	187.7	9.93	2	162.8	7.63	17	507.0	20.83	39	1524.9	15.89	18.8
Total . . .	12	193.9	38.46	5	473.5	6.56	3	187.7	9.93	2	211.9	5.86	32	1206.1	16.48	54	2 273.1	14.76	

Number of { train-miles : 23 874 150. / English ton-miles : 7 490 756 100. }

Number of fractures { total : 54. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 14.055. / per 1 billion tkm. or 612 000 000 English ton-miles : 4.408. }

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D. *Light rails*	6.6 %	93.6 %	12	3	...	14	1
D. *Medium rails*	36 %	64 %	35	3	1	39	...
Total . . .			47	6	1	53	1

		Light rails.	*Medium rails.*
E. *a*) New clean fractures	with internal transverse fissure	...	1
	without internal transverse fissure	15	32
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	....	4
	in the head	...	1
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	...	1
d) Number of pieces rails are broken into		...	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SPAIN.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Andalusian Railways.																			
A. Rails outside tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	568	...	...	568	...	...	
Medium.	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	3	...	...	
Total	...	...	...	3	...	...	...	...	...	...	...	...	568	...	...	571	...	...	
B. Rails in tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	
Medium	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	
Total	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	2	...	...	
C. The whole of A and B. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	569	...	...	569	...	...	
Medium.	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	4	...	...	
Total	...	...	...	4	...	...	...	...	...	...	...	...	569	...	...	573	...	...	

Number of { train-miles : 7 760 075. / English ton-miles : 1 605 764 300.

Number of fractures { total : 573. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 462. / per 1 billion tkm. or 612 000 000 English ton-miles : 220.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Central de Aragon Railway.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	4	...	13	4	185.8	13	

Number of train-miles : 2 656 490. Number of English ton-miles : 698 826 250.

	Percentage of fractures in the part covered by the fishplates.	Percentage of fractures in the part clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D. *Light rails*	75	25	4	...	...	2	2
Miles of single track of each class.			185.8	...	...	...	...

E. c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . . } in the web . . . . . *Light rails.* 4

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	Miles.	4	5	Miles.	7	8	Miles.	10	11	Miles.	13	14	Miles.	16	17	Miles.	19	English tons.
Madrid-Saragossa and Alicante Railway.																			
A. Rails outside tunnels. *Light*	...	...	...	1	37.8	16.420	...	89.5	...	...	135.1	...	...	232.4	...	1	494.8	1.256	
A. Rails outside tunnels. *Medium*	...	832.6	...	1	717.6	0.866	5	140.5	22.104	2	508.9	2.442	2	76.6	16.233	10	2 276.2	2.730	
Total . . .	...	832.6	...	2	755.4	1.645	5	230.0	13.502	2	644.0	1.929	2	309.0	4.023	11	2 771.0	2.466	
B. Rails in tunnels. *Light*	..	...	...	...	...	...	...	0.2	...	...	1.0	...	...	...	...	...	1.2	...	15.7
B. Rails in tunnels. *Medium*	...	12.4	...	1	18.8	33.222	1	1.2	500.000	...	...	...	...	...	...	2	32.4	38.387	
Total . . .	...	12.4	...	1	18.8	33.222	1	1.4	435.000	...	1.0	...	...	...	...	2	33.6	37.037	
C. The whole of A and B. *Light*	...	...	...	1	37.8	16.420	...	89.7	...	...	136.1	...	...	232.4	...	1	496.0	1.253	
C. The whole of A and B. *Medium*	...	845.0	...	2	736.4	1.688	6	141.7	26.293	2	508.9	2.442	2	76.6	16.233	12	2 308.6	3.230	
Total . . .	...	845 0	...	3	774.2	2.408	6	231.4	16.345	2	645.0	1.927	2	309.0	4.023	13	2 804.6	2.88	

Number of { train-miles : 36 121 380. / English ton-miles : 11 705 524 000.

Number of fractures { total : 13. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 2.237. / per 1 billion tkm. or 612 000 000 English ton-miles : 0.679.

	Percentage of fractures in the part: covered by the fishplates.	Percentage of fractures in the part: clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	on curves of ⩽ 800 m. (40 chains) radius: Higher rail.	on a rising or falling gradient: ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient: > 10 mm. per m. (1 in 100).
D. *Light rails*	100 %	...	1	...	...	...	1
D. *Medium rails*	16.67 %	83.33 %	7	5	...	9	2
Total . . .			8	5	...	9	3
Miles of single track of each class.			149.1	2 131.3		1 180.6	609.6

		Light rails.	*Medium rails.*
E. — *a*) New clean fractures	with internal transverse fissure	...	1
	without internal transverse fissure	...	3
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	...	5
	in the head	1	3
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	..	...
		2	2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			Age of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Northern Railway of Spain.		Miles.			Miles.			Miles.			Miles.			Miles			Miles.		English tons.
A. Rails outside tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	37	...	36.16	37	635.8	36.16	
Medium.	19	...	5.45	29	...	8.32	7	...	2.01	7	...	2.01	14	...	4.02	76	2 166.2	21.80	
Total . . .	19	...	4.21	29	...	6.43	7	...	1.55	7	...	1.55	51	...	11.31	113	2 802.0	25.06	
B. Rails in tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	..	4	...	241.55	4	10.3	241.55	
Medium.	3	...	23.07	16	...	123.06	19	...	146.14	4	...	30.77	4	...	30.77	46	80.8	353.81	18.2
Total . . .	3	...	20.47	16	...	109.16	19	...	129.63	4	...	27.29	8	...	54.58	50	91.1	341.12	
C. The whole of A and B *Light.*	...	...	...	...	...	...	...	...	...	...	..	...	41	...	39.43	41	646.1	39.43	
Medium.	22	...	6.08	45	...	12.44	26	...	7.19	11	...	3.04	18	...	4.98	122	2 247.0	33.74	
Total . . .	22	...	4.73	45	...	9.66	26	...	5.58	11	...	2.36	59	...	12.67	163	2 893.1	35.00	

Number of { train-miles : 39 053 850. / English ton-miles : 2 838 988 500.

Number of fractures { total : 163. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 25.93. / per 1 billion tkm. or 612 000 000 English ton-miles : 35.11.

	Percentage of fractures in the part		NUMBER OF FRACTURES :				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D. *Light rails* . .	22 %	78 %	24	6	11	29	12
Medium rails .	45.9 %	54.1 %	76	30	16	76	46
Total . .			100	36	27	105	58
Miles of single track of each class.			2 307.8	585.3		1 271.2	635.2

		Light rails.	*Medium rails.*
E. *a*) New clean fractures	with internal transverse fissure	14	28
	without internal transverse fissure	11	38
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	2	10
	in the head	7	20
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	7	26
d) Number of pieces rails are broken into		2	2

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. 1929-1934 incl.			5 to 10 years. 1924-1928 incl.			10 to 15 years. 1919-1923 incl.			15 to 20 years. 1914-1918 incl.			More than 20 years. 1913 and prior.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
UNITED STATES OF AMERICA:		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Baltimore and Ohio Railroad.																			
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	50	760	61	50	760	61	
Medium	52	496	65	578	1 595	226	306	717	267	389	935	260	459	1 834	157	1784	5 577	200	
Heavy	113	684	103	238	714	208	42	152	173	...	...	...	...	...	...	393	1 550	158	
Total	165	1 180	87	816	2 309	221	348	869	250	389	935	260	509	2 594	125	2227	7 887	177	
B. Rails in tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	31
Medium	6	5	750	4	5	500	2	3	417	...	..	...	...	...	...	12	13	577	
Heavy	47	12	2 448	13	7	1 161	...	...	...	...	...	...	...	...	...	60	19	1 974	
Total	53	17	1 951	17	12	885	2	3	417	...	...	...	..	...	...	72	32	1 406	
C. The whole of A and B. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	50	760	61	50	760	61	
Medium	58	501	72	582	1 600	227	308	720	267	389	935	260	459	1 834	157	1796	5 590	201	
Heavy	160	696	144	251	721	218	42	152	173	...	...	...	...	...	...	453	1 569	180	
Total	218	1 197	114	833	2 321	224	350	872	251	389	935	260	509	2 594	125	2299	7 919	182	

Number of { train-miles : 57 000 000 / English ton-miles : 81 700 000 000 } Includes passenger trains.

Number of fractures { total : 2 299. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 250.0. / per 1 billion tkm. or 612 000 000 English ton-miles : 17.2.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	on curves of ⩽ 800 m. (40 chains) radius: Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m (1 in 100).
D. *Light rails*	34 %	66 %	...	...	...	...	...
Medium rails	65 %	35 %	...	...	...	...	...
Heavy rails	41 %	59 %	...	...	...	...	...

		Light rails.	*Medium rails.*	*Heavy rails.*
E. *a)* New clean fractures	with internal transverse fissure (new and rusted)	...	473	252
	without internal transverse fissure (new and rusted)	50	1 323	201

Note. — Rails with interior defects found by detector cars excluded from above statement — 552 rails (see table hereafter).

Fissured rails removed January 1, 1933, to December 31, 1934, found with detector cars.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. 1929-1934			5 to 10 years. 1924-1928			10 to 15 years. 1919-1923			15 to 20 years. 1914-1918			More than 20 years. 1913 and prior.			The whole of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
Baltimore & Ohio Railroad.																			
A. Rails outside tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	
Medium.	...	50	...	140	590	147	24	200	75	40	100	250	11	10	688	215	950	142	
Heavy	123	496	155	198	547	226	10	141	44	...	...	...	...	...	...	331	1 184	175	
Total	123	546	141	338	1 137	186	34	341	62	40	100	250	11	10	688	546	2 134	160	
B. Rails in tunnels. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Medium.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Heavy	4	4	625	2	3	416	...	...	...	...	...	...	...	...	...	6	7	535	
Total	4	4	625	2	3	416	...	...	...	...	...	...	...	...	...	6	7	535	
C. The whole of A and B. *Light.*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Medium.	...	50	...	140	590	148	24	200	75	40	100	250	11	10	688	215	950	142	
Heavy	127	500	159	200	550	227	10	141	44	...	...	...	...	...	...	337	1 191	177	
Total	127	550	144	340	1 140	186	34	341	62	40	100	250	11	10	688	552	2 141	161	

The above 552 rails were all interior defects, either transverse, or compound fissures, in some instances cracked out to the surface, detected by the Sperry detector car in a test conducted between October 30, 1933 and April 4, 1934.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles.			Miles.			Miles.			Miles			Miles.		English tons.
Delaware and Hudson Railroad.																			
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	0.59	...	...	8.22	...	1	206.73	3.0	1	215.54	2.9	29.69
Medium	98	139.56	439.4	121	276.53	273.1	47	168.09	174.7	17	50.31	211.5	15	81.38	115.4	298	715.87	260.2	33.48
Heavy	8	163.35	30.7	...	...	...	...	4.29	...	...	...	...	...	...	...	8	167.64	29.9	33.48
Total	106	302.91	218.6	121	276.53	273.1	47	172.97	169.7	17	58.53	181.5	16	288.11	34.7	307	1 099.05	174.6	
B. Rails in tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Medium	...	0.42	...	...	0.17	...	...	...	...	...	...	...	...	...	...	...	0.59	...	33.48
Heavy	...	0.11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.11	...	33.48
Total	...	0.53	...	...	0.17	...	...	...	...	...	...	...	...	...	...	...	0.70	...	
C. The whole of A and B. *Light*	...	...	...	...	...	...	...	0.59	...	...	8.22	...	1	206.73	3.0	1	215.54	2.9	29.69
Medium	98	139.98	437.4	121	276.70	273.1	47	168.09	174.7	17	50.31	211.5	15	81.38	115.4	298	716.46	259.6	33.48
Heavy	8	163.46	30.5	...	...	...	...	4.29	...	...	...	...	...	...	...	8	167.75	29.7	33.48
Total	106	303.44	218.1	121	276.70	273.1	47	178.97	169.7	17	58.53	181.5	16	288.11	34.7	307	1 099.75	174.4	

Number of { train-miles : 7 998 832. / English ton-miles : 11 087 736 018.

Number of fractures { total : 307. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 239.9. / per 1 billion tkm. or 612 000 000 English ton-miles : 16.9.

	Percentage of fractures in the part: covered by the fishplates.	clear of the fishplates	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails*	...	100 %	1	...	...	No record.	
Medium rails	15 %	85 %	182	73	43		
Heavy rails	63 %	37 %	5	3	...		
Total			188	76	43		
Miles of single track of each class.			835.83	263.92			

		Light rails.	*Medium rails.*	*Heavy rails.*
E. *a*) New clean fractures	with internal transverse fissure	...	130	1
	without internal transverse fissure	1	168	7
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	No record.		
	in the head			
c) Fractures with much rusted old part, *not* extending	in the web			

PENNSYLVANIA RAILROAD COMPANY

(Including Long Island Railroad Company).

Year.	Type of rail.	Classification of failures. — Years 1933-1934.							
		Transverse fissures.	Other breakages.	Flow of metal.	Crushed heads.	Split heads.	Web.	Base.	Total.
1933	*Light*	...	...	...	...	...	...	...	...
	Medium	330	656	23	74	447	610	33	2 173
	Heavy	866	158	47	151	430	319	2	1 973
	Total	1 196	814	70	225	877	929	35	4 146
1934	*Light*	...	...	...	...	...	...	...	...
	Medium	261	734	16	72	282	692	42	2 099
	Heavy	609	148	33	136	544	441	1	1 912
	Total	870	882	49	208	826	1 133	43	4 011
Summary	*Light*	...	...	...	...	...	...	...	...
	Medium	591	1 390	39	146	729	1 302	75	4 272
	Heavy	1 475	306	80	287	974	760	3	3 885
	Total	2 066	1 696	119	433	1 703	2 062	78	8 157

Average length of lines in service . . . . . { in 1933 — 27 000.21 miles. in 1934 — 26 744.60 miles.

Number of train-miles (freight and passenger) . . . . . { in 1933 — 78 276 832. in 1934 — 78 409 850.

Number of gross ton-miles (including locomotives) . . . . { in 1933 — 76 321 566 000. in 1934 — 79 575 139 000.

Maximum axle load on main line track . . . . . { locomotives : 72 500 to 79 000 lb. cars : 62 750 lb.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Reading Company.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles		Gross tons.
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	1	136.5	5	1	136.5	5	
Medium	...	...	...	1	65.2	10	5	369.2	8	7	213.4	21	15	76.9	120	28	724.7	24	
Heavy	133	210.4	396	240	574.5	261	37	484.4	48	...	...	...	...	...	...	410	1 269.3	202	
Total	133	210.4	396	241	639.7	235	42	853.6	31	7	213.4	21	16	213.4	47	439	2 130.5	129	
B. Rails in tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	28.22
Medium	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Heavy	8	3.0	1 600	1	0.5	1 250	...	...	...	...	...	...	...	...	...	9	3.5	1 500	
Total	8	3.0	1 600	1	0.5	1 250	...	...	...	...	...	...	...	...	...	9	3.5	1 500	
C The whole of A and B. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	1	136.5	5	1	136.5	5	
Medium	...	...	...	1	65.2	10	5	369.2	8	7	213.4	21	15	76.9	120	28	724.7	24	
Heavy	141	213.4	413	241	575.0	262	37	484.4	48	...	...	...	...	...	...	419	1 272.8	206	
Total	141	213.4	413	242	640.2	236	42	853.6	31	7	213.4	21	16	213.4	47	448	2 131.0	131	

Number of { train-miles : 18 744 733. / gross ton-miles : 18 376 971 000.

Number of fractures { total : 448. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 149. / per 1 billion tkm. or 612 000 000 gross ton-miles : 14.9.

	Percentage of fractures in the part: covered by the fishplates.	clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails*	100 %	...	...	...	1		
Medium rails	31 %	69 %	17	5	6		
Heavy rails	18 %	82 %	341	44	34		
Total			358	49	41	No records.	
Miles of single track of each class.			2 091.3	42.7			

		Light rails.	*Medium rails.*	*Heavy rails.*
E. *a)* New clean fractures	with internal transverse fissure	...	9	270
	without internal transverse fissure	1	19	149
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	...	...	...
	in the head	...	...	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	...	...	...

OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			Age of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FRANCE. State Railways (*).		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light.*	...	3.7	...	...	43.5	...	1	40.4	15	2	284.6	4	421	4 028.4	65	424	4 400.6	60	
Medium	23	1 352.8	11	35	932.1	23	18	428.7	26	4	757.5	3	45	649 3	43	125	4 123 4	19	
Heavy	...	10 6	...	4	4.4	570	...	1.9	...	...	...	...	...	...	...	4	16.9	148	
Total . . .	23	1 370.1	10	39	980.0	25	19	471.0	25	6	1 042.1	4	466	4 677.7	62	553	8 540.9	40	
B. Rails in tunnels. *Light.*	...	...	...	...	...	...	...	0.6	...	...	...	...	1	1.9	333	1	2.5	250	19.7
Medium.	...	0.6	...	...	1.9	...	1	1.9	333	...	4.3	...	...	0 6	...	1	9.3	66	
Heavy	1	31.0	20	1	16.8	37	1	1.2	500	...	...	...	...	...	...	3	49.0	38	
Total . . .	1	31.6	20	1	18.7	33	2	3.7	333	...	4.3	...	1	2.5	250	5	60.8	51	
C. The whole of A and B *Light*	...	3.7	...	...	43.5	...	1	41.0	15	2	284.6	4	422	4 030.3	65	425	4 403.1	60	
Medium	23	1 353.4	11	35	934.0	23	19	430.6	27	4	761.8	3	45	649.9	3	126	4 132.7	19	
Heavy	1	47.6	15	5	21.2	147	1	3.1	200	...	...	...	...	...	...	7	65.9	66	
Total . . .	24	1 404.7	11	40	998.7	25	21	474.7	27	6	1 046.4	4	467	4 680.2	62	558	8 601.7	40	

Number of { train-miles : 85 276 800. / English ton-miles : 27 319 343 300.

Number of fractures { total : 558. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 41. / per 1 billion tkm. or 612 000 000 English ton-miles : 12.5.

	Percentage of fractures in the part		NUMBER OF FRACTURES :				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails*	27 %	73 %	259	103	63	170	89
Medium rails	75 %	25 %	112	9	5	85	1
Heavy rails	100 %	...	7	...	...	7	...
Total . . .			378	112	68	262	90
Miles of single track of each class.			7 350.0	1 251.7		7 135.9	724.5

		Light rails.	*Medium rails.*	*Heavy rails.*
E. *a*) New clean fractures	with internal transverse fissure	5 = 1 % app.	...	...
	without internal transverse fissure	177 = 42 % »	39 = 31 % app.	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	124 = 29 % »	22 = 17 % »	1 = 14 % app.
	in the head	61 = 14 % »	31 = 25 % »	3 = 43 % »
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	58 = 14 % »	34 = 27 % »	3 = 43 % »

d) Number of pieces rails are broken into

	Pieces	2	3	4	5	6	7	8	Total
Light rails	Fractures	328	23	6	3	2	2	1	425
Medium rails	Fractures	96	20	6	3	1			126
Heavy rails	Fractures	6	1						7

(*) Running track only.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Less than 5 years. Length of single track of this class.	Less than 5 years. Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	5 to 10 years. Length of single track of this class.	5 to 10 years. Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	10 to 15 years. Length of single track of this class.	10 to 15 years. Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	15 to 20 years. Length of single track of this class.	15 to 20 years. Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	More than 20 years. Length of single track of this class.	More than 20 years. Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	The whole of the rails. Length of single track of this class.	The whole of the rails. Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alsace-Lorraine Railways including Guillaume-Luxembourg Lines.		Miles.			Miles.			Miles.			Miles.			Miles.				Miles.		English tons.
A. Rails outside tunnels. *Light*	...	...	...	...	...	...	...	21.1	...	3	129.3	14	137	1 072.8	79	140	1 223.2	71	according to lines.
Medium	5	319.4	10	15	285.8	33	15	218.1	43	10	39.8	156	15	271.5	34	60	1 134.6	33	
Heavy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Total	5	319.4	10	15	285.8	33	15	239.2	39	13	169.1	48	152	1 344.3	70	200	2 357.8	53	
B. Rails in tunnels. *Light*	...	...	...	...	...	...	...	...	...	3	3.1	600	...	0.6	...	3	3.7	500	Wagons: 15.7 to 17.7. Locos: 18.3 to 19.7.
Medium	...	3.7	...	3	7.5	250	...	0.6	...	...	1.9	...	1	0.9	666	4	14.6	170	
Heavy	...	9.3	...	...	1.9	...	...	...	...	...	...	...	...	...	...	...	11.2	...	
Total	...	13.0	...	3	9.4	200	...	0.6	...	3	5.0	375	1	1.5	400	7	29.5	148	
C. The whole of A and B. *Light*	...	...	...	...	...	...	...	21.1	...	6	132.4	28	137	1 073.4	79	143	1 226.9	72	
Medium	5	323.1	10	18	293.3	42	15	218.7	43	10	41.7	149	16	272.4	36	64	1 149.2	35	
Heavy	...	9.3	...	...	1.9	...	...	...	...	...	...	...	...	...	...	...	11.2	...	
Total	5	332.4	9	18	295 2	42	15	239.8	39	16	174 1	57	153	1 345.8	70	207	2 387.3	54	

Number of { train-miles: 34 022 400. English ton-miles: 14 181 965 000.

Number of fractures { total: 207 per 10 000 000 tr.-km. or 6 250 000 train-miles: 38. per 1 billion tkm. or 612 000 000 English ton-miles: 9.

Note. — This table does not include fractures of *machined rails* in points and crossings, i. e. nose, and wing rails, tongues and stock rails.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D *Light rails*	75.52 %	24.48 %	86	36	21	98	13
Medium rails	57.82 %	42.18 %	58	5	1	41	...
Heavy rails	...	...	...	...	...	...	...
Total			144	41	22	139	13
Miles of single track of each class.			1 846.2	499.6		1 632.4	208.2

		Light rails.	*Medium rails.*	*Heavy rails.*
E. *a)* New clean fractures	with internal transverse fissure	9 04 %	15.62 %	...
	without internal transverse fissure	30.08 %	31.26 %	...
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	16.80 %	21.88 %	...
	in the head	13.30 %	15.62 %	...
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	30.78 %	15.62 %	...
	Pieces	2 / 3 / 4 / 5 / 7	2 / 3 / 4 / 5 / 7	...
		103 / 26 / 9 / 4 / 1	30 / 7 / 5 / 1 / 1	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			Total of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Paris Circle Railways (*).		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	...	0.3	...	...	0.2	...	...	0.1	...	...	0.7	...	3	19.7	94.60	3	21.3	87.32	
A. Rails outside tunnels. *Medium*	...	14.8	...	8	72.1	68.88	3	30.3	62.76	...	10.6	...	7	6.7	649.71	18	134.5	83.51	
A. Rails outside tunnels. *Heavy*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
A. Total	...	15.1	...	8	72.3	68.66	3	30.7	61.98	...	11.3	...	10	26.4	235.37	21	155.8	84.07	
B. Rails in tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2	...	...	0.2	...	
B. Rails in tunnels. *Medium*	...	...	...	...	0.2	...	...	0.8	...	...	...	...	...	...	...	...	1.0	...	18.9
B. Rails in tunnels. *Heavy*	...	1.5	...	...	3.4	...	...	0.8	...	...	...	...	...	...	...	...	5.7	...	
B. Total	...	1.5	...	...	3.6	...	...	1.6	...	...	...	...	...	0.2	...	...	6.9	...	
C. The whole of A and B. *Light*	...	0.3	...	...	0.2	...	...	0.4	...	...	0.7	...	3	19.9	93.41	3	21.5	86.79	
C. The whole of A and B. *Medium*	...	14.8	...	8	72.3	68.73	3	31.1	61.04	...	10.6	...	7	6.7	649.71	18	135.5	82.90	
C. The whole of A and B. *Heavy*	...	1.5	...	...	3.4	...	...	0.8	...	...	...	...	...	...	...	...	5.7	...	
C. Total	...	16.6	...	8	75.9	65.46	3	32.3	58.74	...	11.3	...	10	26.6	233.15	21	162.7	80.45	

Number of { train-miles : 2 670 670. / English ton-miles : 1 221 856 900. }

Number of fractures { total : 21. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 48.86. / per 1 billion tkm. or 612 000 000 English ton-miles : 10.51. }

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ≤ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	≤ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails*	66.67 %	33.33 %	2	...	1	2	...
D. *Medium rails*	55.55 %	44.44 %	7	5	6	13	3
D. *Heavy rails*	...	...	...	...	...	...	...
Miles of single track of each class.			9	5	7	15	
Total			119.7	43.0		116.0	

E.			PERCENTAGE. *Light.*	PERCENTAGE. *Medium.*
a) New clean fractures	with internal transverse fissure		...	5.55 %
	without internal transverse fissure		33.33 %	27.80 %
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot		...	33.35 %
	in the head		33.33 %	11.10 %
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web		33.33 %	22.20 %

d) Number of pieces rails are broken into.	*Light rails.*	*Medium rails.*
2 pieces.	3	12
3 pieces.	...	5
4 pieces.	...	1

(*) In running tracks (excluding points and crossings).

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Est Railway. (*)		Miles.			Miles			Miles.			Miles.			Miles.			Miles		English tons.
A. Rails outside tunnels. *Light*	...	12.9	...	...	63.4	...	2	94.5	13	2	73.9	17	283	2 292.8	77	287	2 537.5	71	
A. Rails outside tunnels. *Medium*	19	778.9	15	36	665.7	34	4	359.8	7	6	306.3	12	160	1 311.8	76	225	3 422.5	41	
A. Rails outside tunnels. *Heavy*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
A. Rails outside tunnels. Total	19	791.8	15	36	729.1	31	6	454.3	8	8	380.2	13	443	3 604.6	76	512	4 779.4	53	
B Rails in tunnels. *Light*	...	...	...	...	...	...	...	0.1	...	...	...	...	2	4.4	286	2	4.5	279	19.7
B Rails in tunnels. *Medium*	..	0.7	...	...	1.5	...	1	2.2	283	...	0.4	...	1	3.6	172	2	8.4	147	
B Rails in tunnels. *Heavy*	...	12.0	...	4	13.5	184	1	1.9	328	...	...	...	.	...	...	5	27.4	113	
B Rails in tunnels. Total	...	12.7	...	4	15.0	165	2	4.2	296	...	0.4	...	3	8.0	234	9	40.3	138	
C. The whole of A and B. *Light*	...	12.9	...	..	63.4	...	2	94.6	13	2	73 9	17	285	2 297.2	77	289	2 542.0	70.6	
C. The whole of A and B. *Medium*	19	779.6	15	36	667.2	34	5	362.0	8.6	6	306.7	12	161	1 315.4	76	227	3 430.9	41	
C. The whole of A and B. *Heavy*	...	12.0	...	4	13 5	184	1	1.9	328	...	...	...	...	...	...	5	27.4	113	
C. The whole of A and B. Total	19	804.5	15	40	744 1	34	8	458.5	11	8	380 6	13	446	3 612.6	77	521	6 000.3	54	

Number of { train-miles : 71 007 590. / English ton-miles : 30 975 649 000.

Number of fractures { total : 521. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 45.6. / per 1 billion tkm. or 612 000 000 English ton-miles : 10.3.

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D. *Light rails*	13.15 %	86.85 %	167	52	70	164	30
D. *Medium rails*	54.62 %	45.38 %	190	16	5	129	2
D. *Heavy rails*	100.00 %	...	5	...	...	2	...
Total			362	68	75	295	32
Miles of single track of each class.			4 793.0	1 207.3		3 885.5	358.5

		Light.	*Medium.*	*Heavy.*
E. a) New clean fractures	with internal transverse fissure	32 = 11.08 %	23 = 10 %	...
	without internal transverse fissure	146 = 50.52 %	55 = 24.23 %	3 = 60 %
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	53 = 18.34 %	55 = 24.23 %	...
	in the head	34 = 11.76 %	45 = 19.94 %	1 = 20 %
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	24 = 8.30 %	49 = 21.60 %	1 = 20 %

d) Number of pieces rails are broken into		2	3	4	5	9	2	3	4	5	2	4
	Pieces											
	Breakages	266	16	5	1	1	195	24	6	2	4	1

OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			Total.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Nord Railway. (*)		Miles			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	...	..	...	...	...	...	...	98.7	...	7	274.1	15.9	171	595.4	178.5	178	968.2	114.2	
Medium	10	395.4	15.7	58	531.1	67.9	92	429.1	133.2	5	535.4	5.8	132	1 094.9	74.9	297	2 985.9	61.8	
Heavy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Total	10	395.4	15.7	58	531.1	67.9	92	527.8	108.3	12	809.5	9.2	303	1 690.3	111.4	475	3 954.1	74.6	
B. Rails in tunnels. *Light*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Medium	...	1.2	...	...	0.4	...	...	0.4	...	...	0.7	...	1	0.9	714	1	3.6	169.5	19.7
Heavy	...	3.5	...	...	2.1	...	...	2.7	...	...	...	...	...	...	...	...	8.3	...	
Total	...	4.7	...	...	2.5	...	...	3.1	...	...	0.7	...	1	0.9	714	1	11.9	52	
C. The whole of A and B. *Light*	...	...	...	...	...	...	...	98.7	...	7	274.1	15.9	171	595.4	178.5	178	968.2	114.2	
Medium	10	396.6	15.6	58	531.5	67 8	92	429.5	133	5	536.1	5.8	133	1 095 8	75.4	208	2 989.5	62	
Heavy	...	3.5	...	...	2.1	...	...	2 7	...	...	...	...	...	...	...	...	8.3	...	
Total	10	400.1	15.5	58	533.6	67.5	92	530.9	107.7	12	810.2	9.2	304	1 691.2	111.6	476	3966.0	74.6	

Number of { train-miles : 69 314 875.
English ton-miles : 29 896 711 400.

Number of fractures { total : 476.
per 10 000 000 tr.-km. or 6 250 000 train-miles : 43.
per 1 billion tkm. or 612 000 000 English ton-miles : 10.

	Percentage of fractures in the part		NUMBER OF FRACTURES :				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius. Lower rail.	on curves of ⩽ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D. *Light rails*	21 %	79 %	121	27	30	74	40
Medium rails	82 %	18 %	264	25	9	160	4
Heavy rails	...	...	...	...	...	...	...
Total			385	52	39	234	44
Miles of single track of each class.			3 470	496		2 570	317.5

		Light.	*Medium*
E. *a)* New clean fractures	with internal transverse fissure	24 = 13 % approx	8 = 3 % approx.
	without internal transverse fissure	94 = 53 % "	113 = 38 % "
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	30 = 17 % "	29 = 10 % "
	in the head	10 = 6 % "	39 = 13 % "
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	20 = 11 % "	109 = 36 % "

d) Number of pieces rails are broken into

	Pieces	2	3	4	5	6	7
Light	Breakages	165	7	2	2	1	1
Medium	Pieces	2	3	4	5	6	
	Breakages	229	46	12	10	1	

(*) Running track only.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Paris-Orléans-Midi Railways. Former Paris-Orléans Railway. (*)		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. Light	...	61.9	...	2	257.3	4.8	1	269.8	2.3	5	367.3	8.4	38	2 082.5	11.3	46	3 038 8	9.4	
A. Rails outside tunnels. Medium	5	601.1	5.1	27	1 459.8	11.8	13	170.8	47.3	6	28.5	130	28	823.1	21.1	79	3 083.3	15.9	
A. Rails outside tunnels. Heavy	1	0.3	1.9	2	0.6	188	...	0.7	...	...	...	...	...	...	...	3	1.6	1 071	
A. Rails outside tunnels. Total	6	663.3	5.6	31	1 717.7	11.2	14	441.3	19.7	11	395.8	17.3	66	2 905.6	14.1	128	6 123.7	12.9	
B. Rails in tunnels. Light	...	...	...	...	...	...	...	0.7	...	3	1.4	1.304	...	3.3	...	3	5 4	333	18.7
B. Rails in tunnels. Medium	6	5.7	648	3	1.2	156	...	2.6	...	...	0.3	...	6	5.9	629	15	15.8	588	
B. Rails in tunnels. Heavy	3	11.5	162	9	36.6	153	2	19.3	64.5	...	...	...	...	...	...	14	67.3	129	
B. Rails in tunnels. Total	9	17.2	322	12	37.8	197	2	22.6	54.9	3	1 7	1.035	6	9.2	405	32	88.5	223	
C. The whole of A and B. Light	...	61.9	...	2	257.3	4.8	1	270.5	2.3	8	368.7	13.5	38	2 085.8	11 3	49	3 044.2	10	
C. The whole of A and B. Medium	11	606.8	1.1	30	1 461.0	12.8	13	173.4	46.7	6	28.8	12.9	34	829.0	25.4	94	3 099.1	19	
C. The whole of A and B. Heavy	4	11.8	21	11	37.2	183.3	2	20.0	62.1	...	...	...	...	...	...	17	68 9	15	
C. The whole of A and B. Total	15	680.5	13.6	43	1 755.5	15.2	16	463.9	21.4	14	397.5	21 8	72	2 914.8	15.3	160	6 212 2	16	

Number of { train-miles : 71 589 700. / English ton-miles : 35 502 869 400.

Number of fractures { total : 160. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 14. / per 1 billion tkm. or 612 000 000 English ton-miles : 2.75.

	Percentage of fractures in the part covered by the fishplates.	Percentage of fractures in the part clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ≤ 800 m. (40 chains) radius. Lower rail.	on curves of ≤ 800 m. (40 chains) radius. Higher rail.	on a rising or falling gradient ≤ 10 mm. per m. (1 in 100).	on a rising or falling gradient > 10 mm. per m. (1 in 100).
D. Light rails	16 = 32.65 %	33 = 67.35 %	31	12	6	17	15
D. Medium rails	36 = 38.30 %	58 = 61.70 %	70	15	9	48	14
D. Heavy rails	10 = 58.80 %	7 = 41 20 %	12	3	2	10	4
Total			113	30	17	75	33
Miles of single track of each class.			4 892.3	1 319.9		4 097.0	1 059.1

			Light rails.	Medium rails.	Heavy rails
E. a) New clean fractures	with internal transverse fissure		...	...	1
	without internal transverse fissure		12	4	3
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot		2	14	...
	in the head		17	29	1
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web		18	47	12
d) Number of pieces rails are broken into	pieces	2 / 3 / 6 / 9 and over	2 / 3 / 4		2 / 3
	fractures	39 / 8 / 1 / 1	77 / 12 / 5		14 / 3

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	Less than 5 years.			5 to 10 years.			10 to 15 years.			15 to 20 years.			More than 20 years.			Age of the rails.			Maximum axle load.
	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Paris-Orléans-Midi-Railways. Former Midi System.(*)		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light.*	...	...	...	...	4.0	...	...	0.9	...	7	11.8	368	95	1 854.8	32	102	1 871.5	34	
A. Rails outside tunnels. *Medium*	9	450.1	12	19	380.9	30	88	544.5	100	27	125.4	133	...	0.6	...	143	1 501.5	59	
A. Rails outside tunnels. Total	9	450.1	12	19	384.9	30	88	545.4	100	34	137.2	153	95	1 855.4	32	245	3 373.0	45	
B. Rails in tunnels. *Light.*	...	...	...	...	0.2	...	...	0.2	...	...	...	....	8	27.1	183	8	27.5	180	18.7
B. Rails in tunnels. *Medium*	2	15.8	78	4	11.3	219	9	8.4	676	2	2.7	465	...	...	...	17	38.2	277	
B. Rails in tunnels. Total	2	15.8	78	4	11.5	215	9	8.6	663	2	2.7	465	8	27.1	183	25	65.7	236	
C The whole of A and B. *Light.*	...	...	...	...	4.2	...	...	1.1	...	7	11.8	368	103	1 881.9	34	110	1 899.0	36	
C The whole of A and B. *Medium*	11	465.9	14	23	392.2	36	97	552.9	109	29	128.1	140	...	0.6	...	160	1 539.7	64	
C The whole of A and B. Total	11	465.9	14	23	396.4	36	97	554.0	108	36	139.9	160	103	1 882 5	34	270	3 438.7	48	

Number of { train-miles : 40 723 200. / English ton-miles : 16 256 221 900.

Number of fractures { total : 270. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 41. / per 1 billion tkm. or 612 000 000 English ton-miles : 10.

	Percentage of fractures in the part		NUMBER OF FRACTURES :				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails*	63.6 %	35.4 %	73	20	17	59	15
D. *Medium rails*	83.7 %	16.2 %	132	19	9	104	19
Total			205	39	26	163	34
Miles of single track of each class.			2 670.7	868.0		1 336.0	682.9

		Light rails.	*Medium rails.*
E. a) New clean fractures	with internal transverse fissure	18	12
	without internal transverse fissure	26	55
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	12	13
	in the head	22	32
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head	in the web	31	49

d) Number of pieces rails are broken into		*Light rails.*						*Medium rails.*					
	pieces	2	3	4	5	6	8	2	3	4	5	6	8
	fractures	89	17	2	1	1	0	129	12	9	7	2	1

(*) Running track only.

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	Maximum axle load.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Paris-Lyons-Mediterranean Railways.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels. *Light*	2	9.9	126.41	...	122.9	...	3	149.6	12.46	2	64.4	19.30	270	3 318.2	50.56	277	3 665.0	46.96	
Medium	19	1 260.2	9.37	45	947.3	29.51	50	440.9	70.46	36	566.6	39.48	340	2 348.9	89.94	490	5 563.9	54.72	
Heavy	2	1.4	909.09	1	0.7	909.09	...	...	...	...	...	...	...	...	...	3	2.1	909.09	
Total	23	1 271.5	11.25	46	1 070.9	26.69	53	590.5	55.77	38	631.0	37.42	610	5 667.1	66.88	770	9 231.0	51.84	
B. Rails in tunnels. *Light*	...	1.3	...	...	3.2	...	...	3.3	...	...	3.7	...	19	30.0	387.76	19	41.5	281.48	
Medium	2	39.4	31.50	33	31.0	661.32	7	12.7	343.14	5	19.6	158.23	25	45.2	34.34	72	147.9	302.26	19.6
Heavy	5	45.2	67.31	4	26.0	95.46	...	...	...	...	...	...	...	...	...	9	71.2	78.46	
Total	7	85.9	50.58	37	60.2	381.45	7	16.0	272.37	5	23.3	133.33	44	75.2	361.25	100	260.6	237.86	
C. The whole of A and B. *Light*	2	11.2	111.11	...	126 1	...	3	152.9	12.19	2	68.1	18.26	289	3 348.2	53.65	296	3 706.5	49.62	
Medium	21	1 299.6	10.04	78	978.3	49.54	57	453.6	78.08	41	596.2	43.46	365	2 394.1	94.73	562	5 711.8	61.14	
Heavy	7	46.6	93.33	5	26.7	116.28	...	...	...	...	...	...	...	...	...	12	73.3	101.69	
Total	30	1 357.4	13.73	83	1 131.1	45.59	60	606.5	61.47	43	654.3	40.86	654	5 742.3	70.76	870	9 491.6	56.95	

Number of { train-miles : 138 275 800. English ton-miles : 56 957 773 800.

Number of fractures { total : 870. per 10 000 000 tr.-km. or 6 250 000 train-miles : 39.10. per 1 billion tkm. or 612 000 000 English ton-miles : 9.34.

	Percentage of fractures in the part: covered by the fishplates.	clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ≤ 800 m. (40 chains) radius: Lower rail.	Higher rail.	on a rising or falling gradient: ≤ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails*	51.01 %	48.99 %	156	39	104	239	63
Medium rails	83.63 %	16.37 %	479	27	55	525	33
Heavy rails	75.00 %	25.00 %	10	...	...	10	...
Total			645	66	159	774	96
Miles of single track of each class.			7 169.5	2 322.1		7 969.2	1 522.4

		Light rails.	*Medium rails.*	*Heavy rails.*
E a) New clean fractures	with internal transverse fissure	7 %	7 %	0 %
	without internal transverse fissure	45 %	35 %	59 %
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	16 %	17 %	8 %
	in the head	8 %	11 %	33 %
c) Fractures with much rusted old part, *not* extending	in the web	24 %	30 %	0 %

Number of pieces rails are broken into.	*Light rails.*	*Medium rails.*	*Heavy rails.*
2	234	413	8
3	40	106	2
4	15	34	...
5	6	8	...
6	1	2	...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Société Générale des Chemins de Fer Economiques.		Miles.			Miles.			Miles.			Miles.			Miles.			Miles.		English tons.
A. Rails outside tunnels :																			Standard gauge: 15.7 Metre gauge: 9.0
Light	...	96.9	...	...	45.9	...	...	...	...	...	...	...	263	2 101.5	77.5	263	2 244.3	72.8	

Number of { train-miles : 9 240 500. / English ton-miles : 459 590 800. }

Number of fractures { total : 263 / per 10 000 000 tr.-km. or 6 250 000 train-miles : 176.8. / per 1 billion tkm. or 612 000 000 English ton-miles : 310. }

	Percentage of fractures in the part		NUMBER OF FRACTURES:				
	covered by the fishplates.	clear of the fishplates.	on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius		on a rising or falling gradient	
				Lower rail.	Higher rail.	⩽ 10 mm. per m. (1 in 100).	> 10 mm. per m. (1 in 100).
D. *Light rails.* .	34.6 %	65.4 %	137	54	72	60	55

		Light rails.
E. *a*) New clean fractures	with internal transverse fissure	22
	without internal transverse fissure	55
b) Fractures with much rusted old part, extending to the outer surface of the foot or the head	in the foot	70
	in the head	30
c) Fractures with much rusted old part, *not* extending to the outer surface of the foot or the head . . .	in the web	86
d) Number of pieces rails are broken into		...

NAMES OF ADMINISTRATIONS AND DESCRIPTION OF RAILS.	AGE OF RAILS: Less than 5 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	5 to 10 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	10 to 15 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	15 to 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	More than 20 years. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	The whole of the rails. Number of fractures.	Length of single track of this class.	Number of fractures per 1 000 km. or per 625 miles.	*Maximum axle load.*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Miles.			Miles			Miles.			Miles.			Miles.			Miles.		English tons.
Chemins de Fer secondaires du Nord-Est.																			
A. Rails outside tunnels. { *Light* . .	...	...	...	...	...	...	...	...	...	...	...	...	3(*)	155.3	12	3	155.3	12	

Number of { train-miles : 2 796 200. / English ton-miles : 458 676 225. }

Number of fractures { total : 3. / per 10 000 000 tr.-km. or 6 250 000 train-miles : 6.6. / per 1 billion tkm. or 612 000 000 English ton-miles : 4.0. }

	Percentage of fractures in the part: covered by the fishplates.	Percentage of fractures in the part: clear of the fishplates.	NUMBER OF FRACTURES: on straight lines or curves of > 800 m. (40 chains) radius.	on curves of ⩽ 800 m. (40 chains) radius: Lower rail.	on curves of ⩽ 800 m. (40 chains) radius: Higher rail.	on a rising or falling gradient: ⩽ 10 mm. per m. (1 in 100).	on a rising or falling gradient: > 10 mm. per m. (1 in 100).
D. *Light rails.* .	...	100 %	1	1	1	1	2
Total . . .			1	1	1	1	2

		Light rails.
E. *a*) New clean fractures {	with internal transverse fissure	...
	without internal transverse fissure	3
d) Number of pieces rails are broken into		2

(*) 60.5 lb. per yard rails in service on a 25-mile single-track line carrying heavy traffic.

The fractures bore no trace of rust and did not reveal any well defined defects.

(To be continued.)

MISCELLANEOUS INFORMATION.

[621. 335]

1. — Present tendencies in electric locomotive construction.

(Le Génie Civil.)

Herr Sachs published, in the *Zeitschrift des Vereines deutscher Ingenieure* of the 11th August and 29th September 1934, a general article on electric locomotives, in which he brings out the present tendencies in electric locomotive construction from the mechanical and electrical points of view. The information given below has been taken from this article.

Mechanical part. — Rod drive is giving way to individual axle drive, except in certain special cases; this rule does not apply, however, to shunting locomotives, narrow-gauge locomotives, locomotives with high tractive effort, nor to locomotives repeating standard designs.

In transmitting the power to the axles, couplings based on the Oldham joint and elastic drive are still used, but the advantage of fully suspended motors appears to have been overestimated, at least up to a certain speed, when the complications involved are taken into account. Nose-suspended motors are being used more and more; in this case the motor is carried directly on the axles by two bearings cast on the motor casing which also has on the other side an extension spring supported by one of the frame stays. This method is used on the B_0-B_0 type locomotives of the Midi Railway, with a maximum speed of 90 km. (56 miles) an hour; in Germany it has been found possible by degrees to use this design for speeds of 130 km. (81 miles) an hour, on a Henschel locomotive.

In the Midi locomotives the body is carried on the bogies through reversed spherical centres, that is to say with the concave side towards the track; the centre is depressed in order to increase the lateral stability of the locomotive. This arrangement improves the equalising action of the bogie; the German railways are testing this system on a B_0-B_0 type locomotive.

As revealed by the calculation given in full in the article, when the locomotive is running, the load on the leading driving axle of the bogie is in part transferred to the trailing driving axle; this unequal loading is liable to cause the leading pair of wheels to skid, especially at starting. The Midi Railway has under consideration a design for varying the tractive effort of the two pairs of wheels in the same proportion. In Germany, the *Maffei-Schwartzkopff* Works and the *Bergmann* Works have developed compressed-air devices which, by acting as required on the equalisers, transfer part of the weight of the body to the bogie, so as to overcome the effects of the vertical forces and equalise the load between the two pairs of wheels.

Welded construction has been used in Germany in the case of the underframes of the B_0-B_0 type and the 1-C_0-1 type locomotives; the weight saved was very appreciable. Rolled sections or castings of aluminium alloys are used on motor coaches and narrow-gauge locomotives only.

Electrical equipment. — *Three-phase traction current* is losing ground owing to the complication of the permanent way equipment. In Italy, where this system is widely used, the only new work of this kind consists of extensions of existing three-phase systems. In Switzerland, the already old Berthoud-Thoune line was altered, in 1933, to single-phase in place of three-phase traction. Consequently there is no striking innovation in the equipment of three-phase locomotives.

Direct current is used in several countries, such as France at 1 500 volts, in Morocco, Algeria, Italy and Russia where 3 000 volts has been adopted. There is a tendency to do away with excess-voltage relays on locomotives of all systems, the electrical equipment having to stand any accidental excess

voltage. On direct-current locomotives, probably owing to tradition, aluminium-oxide voltage limiters are still used, or lead plates separated by a layer of copper iodide on the Siemens-Schuckert system. Contactors are no longer used to protect the equipment against excess current as they are too slow, but horn gap circuit breakers, the closing electro-magnets being supplied with current from an independent source. For the resistance in parallel with the main circuit breaker, carbon elements, the resistance of which is regulated by the amount of compression, have been introduced.

No change has been made in regulating the speed of direct-current locomotives; the resistances are brought into circuit by steps, by individually-controlled electro-magnetic or electro-pneumatic contacters, or by mechanical contacters controlled by a cam shaft. The *Skoda* Works have fitted a series of Czechoslovak locomotives of the 1-D_0-1 type with electro-pneumatic cam shaft control with four cylinders, two of which are kept under pressure to act as locks.

Roller bearings are being used generally for the motors and the casings are being fabricated by electric welding to an increasing extent.

Single-phase current, although used in many countries, is not used in France. Two types of locomotives are used, those fitted with voltage-reducing transformers, the motors working with single-phase current, and the mixed systems in which the current is converted into three-phase on the locomotive itself. These variations are due to the difficulty of supplying single-phase motors with current at the 50-cycle industrial frequency; single-phase locomotives therefore require special power stations, the provision of which depends upon the amount of traffic.

Air transformers used by the German railways have not been satisfactory, and for 15 000 volts and over only oil-immersed transformers will be used. For small and medium powers enclosed transformers are used and for high powers the core type. The windings of the most recent transformers are arranged in layers; as a result of the difficulty of providing a sufficient number of connections on the low tension winding, the current is regulated on the high tension side. This method involves the use of two transformers, the first a voltage transformer (input side) for the regulation, the second (on the other side) a power transformer supplied with current at the desired voltage, the latter possibly of the autotransformer type. This gives a vertical three-core type of transformer, one of which having no winding provides a passage for the magnetic flux corresponding to the difference between the lines of force of the two transformers. The *Maffei-Schwartzkopff* Company fits to the transformer a radiator for cooling the oil; the oil is circulated by a centrifugal pump.

Only the dry transformers are protected against excess voltage. Excess current is provided against by the current being cut off at the nearest substation and this has meant suppressing the overload relay on the primary side or fitting it with a time lag, and fitting the short-period relay on the secondary; on the German locomotives the electro-magnet cutting out the main switch is excited by the main alternating current so that this cut-out cannot be operated by the minimum voltage relay if the fall of potential is due to a complete short-circuit on the primary side since, as there is no voltage on the line, no current is fed to the cut-out winding. In the case of the Swiss locomotives, this electro-magnet is energised by an independent supply of direct current; a locking relay then has to be fitted so that the minimum-voltage relay does not throw out the main cut-out switch until the current has been cut off at the substation.

These arrangements in no way interfere with the individual protection of the motors or groups of motors and the heating or other circuits by switches which cut out in the case of excess voltage or short circuit.

The rupturing capacity of the oil circuit breakers is 100 kv.a.; Siemens-Schuckert circuit breakers acting in water using the expansion of the steam to extinguish the arc have been used in several instances; the compressed-air circuit breakers appear to

have good features, but the noise they make is against their use.

The driver used to have to read the voltmeter fitted in shunt on the transformer primary to find out if a section in which the current had been cut off was again under tension; he was therefore obliged to close and open the main circuit breaker many times. This indication is now given by a neon lamp inserted in front of the circuit breaker.

Regulation is now done by a step commutator, by electro-magnetically or electro-pneumatically operated contactors, or mechanically by a cam shaft; this equipment is fitted on the transformer tank. On several recent German locomotives the general regulation is done by means of contacters and a cam shaft, and the so-called « precision regulation » by a special device made by the Maffei-Schwartzkopff Works.

Among *mixed systems*, locomotives with rotary converters taking single-phase current and using direct current motors have been introduced more especially in America; the drawback is that they are very heavy. The Austrian Railways are using a locomotive fitted with a special group with a single-phase converter, two rotary converters, and an exciter used at starting, all carried on the same shaft.

The German Railways are building for the Black Forest lines two type B_0-B_0 direct-current locomotives using single-phase current at 20 000 volts 50 cycles; these locomotives are fitted with mercury vapour rectifiers which also act as regulators and as undulators in connection with regenerative braking.

[621. 133.1 (.456)]

2. — Fuel consumption on Austrian Railways.

Recent technical improvements,

by Frederic STRAUSS,
Central European Correspondent, *Modern Transport.)*

(From *Modern Transport.)*

One of the features that impressed members of the Institute of Transport who visited Austria last June was the successful results attained in connection with the consumption of locomotive coal. The savings are shown graphically on the accompanying curve. In 1923 the consumption of standard coal per 1 000 gross ton-km. amounted to 188.0 kgr. Last year the figure stood at 132.3 kgr. Thus improvement is being maintained. The fuel which has to be obtained for the Austrian Federal Railways is divided up for the most part into pit-coal of the most varied origin and for the rest into native brown coal. In order to be able to judge and compare the value of these different types of fuel and their resultant effect when applied to the haulage of trains the Federal Railways take as the standard of comparison « Normal Coal », which represents that ideal coal 1 kgr. of which will evaporate 4.4 litres of water in a locomotive boiler. The

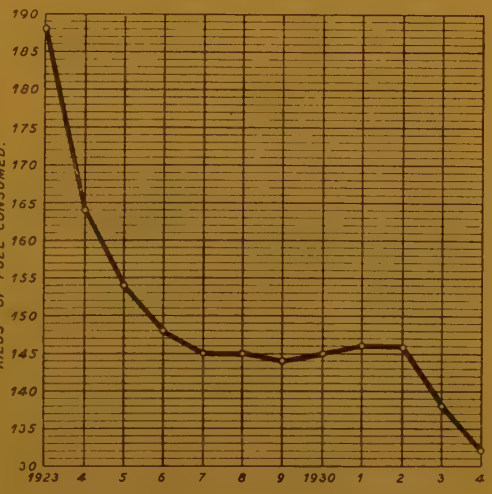


Chart indicating the decline in locomotive coal consumption, Austrian Federal Railways.

conversion value of a given fuel is represented by the ratio of its evaporation figure to that of « Normal Coal » ; thus, for example, D. C. B. Northumberland coal has a conversion value of 1.6, whilst Austrian brown coal stands at as low as 0.7.

The coal-trucks bearing coal for railway use from foreign mines to Austrian delivery stations are allotted by the distributing offices to the running sheds according to a plan that is drawn up each month. Appropriate distribution, with due regard to the different grades and the use to which they are to be put, can have a marked effect on consumption.

Engine coaling and firing methods.

The coaling of the engines usually takes place after the run is finished, and it is the duty of the driver to hand to the coaling-gang a weigh-note, which not only serves to calculate the quantity of fuel, but also serves as a basis for working out the fuel-saving bonus. The initial coaling of a tender to the level of the sides is looked upon as stock of the running shed, and for this reason when a locomotive ceases to run, as in the case of heavy repairs, the driver, on the completion of his run, has to hand in to the service depot another weigh-note giving the amount of coal required to fill up to the level of the sides. When coaling, due regard must be paid to supplying a mixture of such different grades of coal as will best suit the work subsequently to be undertaken.

The actual firing, as also the method of firing, must be adapted to the kinds of fuel used, type of train, load, speeds and conditions of the line at the particular time in question in order to ensure economical consumption. Experience has shown that a thorough training of the fireman adds greatly to the effect; the inspectors must on their test runs convince themselves of the correct manner of firing and instruct accordingly, if necessary. The driver himself can also help to an appreciable degree in saving fuel by a judicious use of throttle and controls, taking advantage of gradients, making the most of the train's momentum, and, in particular, by paying constant attention to the needs of his boiler and by keeping his fireman instructed. Finally, the maintenance of locomotives by the crews must not be overlooked, especially in the service workshops where the driver's views should be borne in mind.

Headquarters measures for fuel economy.

Fuel economy, so far as engine-driving is concerned, is not limited to the attentions of the crews looking after the engines themselves; the measures adopted by headquarters, primarily with a view to using the locomotives to the best advantage, also contribute to sound heating economics. A suitable choice of locomotives in good working order with regard to the work under consideration (such as type of train, speed of travel, track conditions), loading trains up to the hauling capacity of the locomotives and dividing them up in such a manner that the longest possible distances are covered, and, lastly, reducing stops under steam so far as is practicable — all these factors contribute largely to saving fuel.

In every locomotive shed special technical officers are detailed in particular, apart from their ordinary jobs, to devote their attention to measures for effecting a saving in fuel. It is the duty of these men to make comparative tests every month — and, occasionally, after each run — of fuel consumption and thus ascertain which engines, taking into consideration the jobs they have been engaged in, are the most extravagant in this respect compared with others on similar jobs. Each case of this kind has to be explained with due regard to causes; and the crews also have to give their opinions. Moreover, each running shed has a chart on which is noted the consumption of each single engine for the information of all concerned.

Other measures adopted.

After the introduction of the eight-hour day amongst drivers, partly for reasons appertaining to firing, and partly in order to use the locomotives to better advantage in general, it has been found profitable to employ two crews per engine and three crews per engine in the case of constant shunting jobs and for heavy local passenger traffic. Only in isolated cases have special express locomotives remained with only

one crew in order to get them into better condition. With a view to achieving a proper use of fuel when stoking, the locomotive crews were given a financial encouragement, as in pre-war days, by the awarding of a fuel-saving premium which is calculated according to groups, or even sheds. The operation of this premium was dealt with in detail in « Modern Transport » dated April 7, 1934 (1). It is only, however, since 1933, when the calculation of the premium was decided according to locomotives and groups, that any decisive effect has been achieved with regard to coal consumption.

Measures adopted to improve the heat utilisation of locomotives, or to ease the work of firing, include the scrapping of old saturated-steam locomotives, which are heavy on fuel and costly to run on account of heavy repairs, also the putting into service of a considerable number of modern superheated steam locomotives, and the wider use of newer steam locomotives which, owing to electrification, have been released; in addition, a number of technical improvements have been carried out, of which we can specify the following:

Dump grates, which in the case of larger locomotives made cleaning the fire when running an easier job.

Firewalls, which produce better combustion of tiny pieces of coal and the smoke-gases.

Devices to check smoke and prevent showers of sparks, consisting of so-called steam pyramids in the firebox and sheet-metal sheathing in the smoke-box, which at the same time ensure more complete combustion and reduce the ejection of small cinders.

Exhaust-pipes have been transformed to fixed type, as the advantages of the adjustable variety were not great and upkeep was in any case difficult.

Slide-valve chests and cylinders have been better insulated.

A relatively greater heating surface has been introduced in the case of more modern locomotives, owing to increased use of pit-coal.

Preheaters are fitted to about one-third of the locomotives; the newest have the Heinl preheater, which gives the best results. The success of preheaters in the matter of saving coal does not quite come up to the expectations of many, but the fact must not, however, be overlooked that the efficiency of the engines is somewhat raised by their addition.

(1) See also *Bulletin of the Railway Congress*, July 1934.

Attention in the running shed.

With the introduction of superheated steam, piston-valve distribution (gear) came into general use, and thus in course of time a change was made from broad to narrow valve rings. The majority of the newer locomotives are fitted with Lentz gear. Tight packing of piston-valves and pistons, also stuffing-boxes, is an essential condition for the economical use of coal. As in the case of piston-valves, the pistons also were provided with narrow rings. On the superheated steam locomotives the Schmidt stuffing-box was supplanted by the Hauber type, which had proved itself more efficient under running conditions. Careful attention to the locomotives in the running-shed can also reduce fuel consumption. Emphasis is laid on the importance of timely and thorough washing-out of the boilers with hot water, and, in case of need, the application of anti-scale re-agents. Furthermore, keeping the smoke-ways free in the boiler by occasional cleaning out and blowing through, and, in case of necessity, the syringing of the smoke tubes and boiler-tubes with hot water, has a by no means unimportant bearing on the subject of economical heat utilisation.

An achievement by co-operation.

Of outstanding importance in the matter of coal consumption is to keep the locomotives in perfect running order, and crews can help considerably in this by recognising defects in good time and giving notice of them. Measurements have proved that engines not kept in good condition can often use up to one third more coal. Since the introduction of control clocks (Chronhodographs), the shunting operations of the regular shunting locomotives are under constant control, and this has not only led to a partial saving in shunting locomotives, but has also had a good influence on the fuel consumption, as the proportion of idle to effective kilometres run has become smaller.

As will be seen from the particulars given, it is not a single measure that has brought

about this significant reduction in the consumption of locomotive fuels; rather is it the co-operation of individual economy measures. For all have the same object in view. The economy achieved will not remain at its present level because as traffic becomes more rationalised, and further technical progress is made, there will certainly be greater successes.

[621. 133.7 (.42)]

3. — Water softening plant on London and North Eastern Railway. New installations.

(Modern Transport.)

The London and North Eastern Railway Company are installing twenty-two water-softening plants at various points on the system, work progressing so satisfactorily that certain of them are already in operation whilst others are to be brought into use almost immediately. Thirteen of the appliances are being installed between King's Cross and Doncaster, sites for the remaining nine having been chosen on the Great Eastern section, L.N.E.R. The object is to ensure a supply of pure water to the locomotive boilers, thereby obviating the deposit of scale, and the scheme is the direct result of research which has been carried out during the past few years by L.N.E.R. mechanical engineers and chemists. Not only had it to be ascertained where, owing to the hardness of the water supply available, it was necessary to instal the softeners, but also extensive chemical experiments had to be conducted to determine the best type of water softener for use in each locality in order that the number of degrees of hardness might be reduced to a minimum. That the scheme is proving successful may be judged from the fact that natural water having a hardness as high as 45° is being softened to such an extent that when it is supplied to the locomotive boiler it has no more than 2° of hardness.

Water-softening plant of a capacity of 6 250 gallons an hour at Frodingham (L. N. E. R.), supplied by United Water Softeners, Limited.

The plant installed is of capacities ranging from 5 000 to 40 000 gallons per hour to suit the needs at various points. Hydrated lime, soda ash, and a coagulant, sodium aluminate, are added in quantities determined by the composition of the raw water, the lime and soda process effecting the removal of the scale-forming material from the water before it is fed to the locomotive boilers. The plant is designed to secure efficient sedimentation, and the soft water is filtered through wood wool before delivery to the storage tanks for service. Sludge which accumulates in the conical bottoms of the plant — composed largely of material which would otherwise form scale deposits in the boilers — is periodically discharged.

Locomotive maintenance.

As to locomotive feedwater problems generally, it is not without interest to note that London and North Eastern Railway locomotive supplies include all types of water. The magnitude of the water and scale problem to locomotive engineers can, perhaps, be brought more clearly into focus when it is realised, for example, that the engine of the « Flying Scotsman » drawing its load from King's Cross to Edinburgh evaporates about 14 000 gallons of water on the single journey. This water, picked up at various points *en route*, in its raw condition contains approximately 35 lb. of scale-forming material. Scale amounting to several hundredweights is found in the boiler of an engine after 50 000 miles of service in a hard-water district. The frequent washing out of engines removes only the soft and loose material, the harder adhering scale remaining in the boilers. Descaling in the repair shops is ultimately necessary, the cost of which is considerable.

There are, it may be stated, marked differences in the cost of locomotive maintenance for the three areas of the L.N.E.R., due solely to the difference in quality of the water supplies. In the Scottish area the waters generally contain little scale-forming material, the North Eastern area waters being intermediate in quality, whilst in the Southern area hard waters are the rule. The need for water-softening is, therefore, more pronounced in the Southern area, and hence the installation of the softening plants of the principal depots along two sections of the main line in that area. During the year 1934 plant in operation on the L.N.E.R. removed, by softening, 1 136 tons of scale-forming material. When the present schemes are completed a total of forty plants in the North Eastern and Southern areas will have a combined capacity for treating 3 000 million gallons of water per annum, and scale formation to the extent of about 4 000 tons per annum will be prevented.

NEW BOOKS AND PUBLICATIONS.

[621. 13 (.02 & 621. 137 (.02]

NIEDERSTRASSER (L.), Reichbahnrat. — **Leitfaden für den Dampflokomotivdienst** (*Manual for the steam locomotive staff).* — One volume (8 1/4 × 6 inches) of 427 pages with 302 figures and 8 appended tables. — 1935. Verkehrswissenschaftliche Lehrmittelgesellschaft m. b. H. bei der Deuschen Reichsbahn. Potsdamer Platz, 1, Berlin. (Price : 7.15 Reichsmark.)

Herr. Niederstrasser's book is primarily intended for the instruction of the steam locomotive drivers and firemen of the Reichsbahn, and from an instructional point of view it contains many valuable new features.

The author addresses himself to the intelligence rather than the memory of his pupils, and so has been careful to give reasoned explanations of the principles governing the working of the different parts of the locomotive, based on the designs in general use. He avoids giving too many descriptions of the different designs possible in each case, as a knowledge of these is best obtained in practice. Instead of drawings or photographs he uses perspective drawings or diagrams which bring out the points in question very clearly and give the names of the different parts. Such drawings are used profusely throughout the text wherever they can help to make the description more easily understood and make the work original and particularly interesting.

After a short historical note on the origin and development of the steam locomotive, the author gives the principles on which the Reichsbahn classifies and numbers its steam locomotives. A chapter is devoted to the materials used in building the locomotives and the stores actually consumed thereby.

The eductional method used by the author is very clearly seen in Chapter IV giving the fundamental working principles of the locomotive. This chapter is divided into three parts, boiler, engine, and motion. The latter is treated in a most intuitive way.

The author, in Chapter V, the most important of the book, gives the description properly speaking of the various parts of the locomotive, dealing in turn with the boiler and its fittings, the feedwater heaters, the motion, wheels and running gear, and the accessory fittings. He again uses diagrams as he does in Chapter VIII when analysing the air brake in great detail.

The work also has a chapter on the tender and gives brief details of special types of locomotives, such as the high-pressure and turbine. It also deals with locomotive shed equipment, locomotive driving, maintenance, and the kind and frequency of overhauls and repairs.

A general list of the locomotives of the Reichsbahn, a descriptive table and diagram of its standard types, and the D. I. N. tables of standard names of locomotive parts are given in an appendix.

Herr Niederstrasser's work, whilst specially intended for the education of the drivers of the Reichsbahn, can with equal value be consulted by railway students, builders, and technicians throughout the world for the new view points and valuable information on the steam locomotive given therein.

A. C.

OBITUARY.

GEORGES PHILIPPE,

Honorary Inspector General, Nord Belge Railway,
Member of the Permanent Commission of the International Railway Congress Association.

We heard with deep regret of the death of Mr. GEORGES PHILIPPE, Honorary Inspector General of the Nord Belge Railway, member of the Permanent Commission of the International Railway Congress Association. Coming so soon after his retirement, the sad news created a painful sensation in railway circles in which he occupied so eminent a position.

Mr. GEORGES PHILIPPE was on the Nord Belge Railway for more than 40 years. He became general manager with the rank of Inspector General in 1908, on the death of his father, Armand Philippe. Under his enlightened and careful management, the railway, to which he had devoted the best years of his life, always kept pace with technical progress and his services were much appreciated by the public. The introduction of the fast interprovincial services in southern Belgium and the improvement in international relations were largely due to his perseverance and organising ability.

Mr. PHILIPPE took great interest in his staff. At an early date he organised collaboration of the staff with the management by setting up staff delegations and shop committees. He extended the social works considerably.

His great knowledge of railway matters was well known and was never called on in vain. On the Technical Rates Commission set up by the Belgian Government to look into proposed reforms, his disinterested but well informed opinions were listened to with the greatest attention. He also assisted, by his valuable advice, various secondary railways in Belgium and in the Congo Colony.

Mr. GEORGES PHILIPPE was a member of the Permanent Commission of the International Railway Congress Association from 1909. He took an active part in the work of the Association. He regularly attended the meetings of the Permanent Commission and on these occasions was of much assistance in preparing the agendas of the various sessions. Quite recently too he put forward for discussion at the next Congress several questions of organisation of the greatest interest.

The Association has lost in him a devoted member.

We present our respectful sympathy to his family.

The Executive Committee.

ERRATA.

Bulletin, August 1935.

Rail motor cars from the point of view of their construction.

a) Report, by L. DUMAS and J. LÉVY.

Page 902, 18th line in 2nd column.

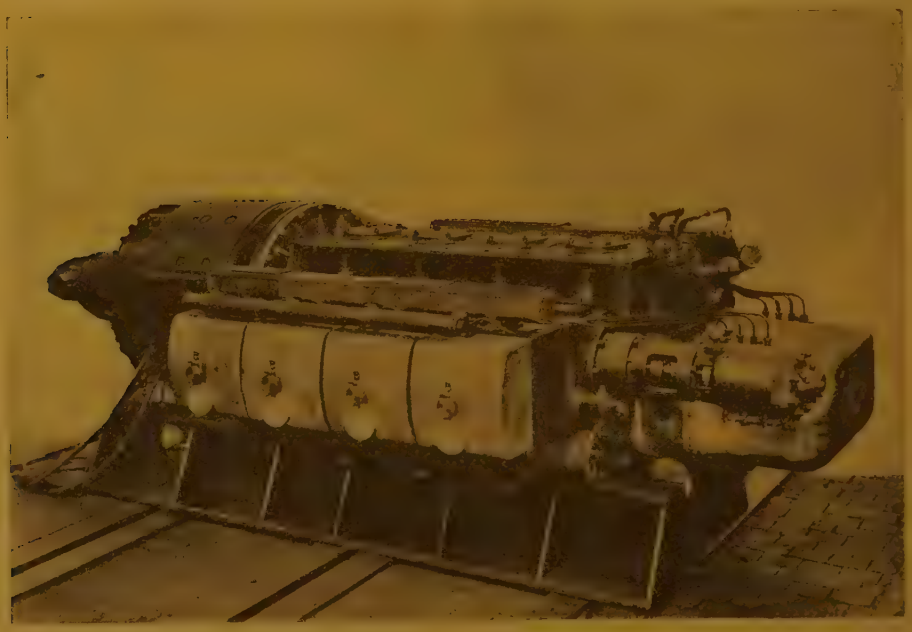
Instead of : « ...floor of the vehicle (150-H.P. CESKO-MORAVSKA-KOLBEN-DANEK (fig. 5); 180-H.P. DEUTSCHE WERKE; 200-H.P. VOMAG; 120-H.P. SKODA) »,

Read : « ...floor of the vehicle (150-H.P. CESKO-MORAVSKA-KOLBEN-DANEK; 180-H.P. DEUTSCHE WERKE; 200-H.P. VOMAG; 120-H.P. SKODA (fig. 5) ».

The legend of figure 5, page 903, is to be altered as follows :

« Fig. 5. — 120-H.P. SKODA horizontal engine. »

*The 150-*H.P. CESKO-MORAVSKA-KOLBEN-DANEK (C. K. D.) *horizontal engine* is illustrated hereafter.



b) Sectional discussion of the reports on the above question.

Page 1099, 1st column, 4th line from the bottom :

Instead of : « Mr. BALS states that the Görlitz type bogies... »,
Read : « Mr. BALS states that the *Gresley* type bogies... ».

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General Secretary of the Permanent Commission of the International Railway Congress Association.

JULY 1935

[016. 385. (02]

I. — BOOKS.

In French.

1935 31
LUMARTIN (H. E. C.).
Les principales sources de documentation statistique.
Paris, Dunod, 92, rue Bonaparte. 1 volume (18 × 27), pages. (Prix : 16 francs français.)

1935 385 (.44)
DDFERNAUX (R.).
Les Grands Réseaux des Chemins de fer français. nnée 1934.
Paris, Dunod, 92, rue Bonaparte. 1 opuscule, 40 pa- et carte.

1935 625 .6 & 656
COBS (L.).
Les « Vicinaux » et la concurrence.
Bruxelles, Imprimerie de l'Echo de la Bourse. 1 bro- ire, 30 pages.

1935 351. 712 (.44)
Recueil des spécifications techniques et cahiers des rges unifiés des Grands Réseaux des chemins de français. Nouvelle édition 1935.
Paris (6e), Dunod, 92, rue Bonaparte. 1 recueil sous tefeuille pegamoïd à dos réglable. (Prix : 185 francs nçais. Les spécifications séparées : 1, 2, 3, 6, 12, 14 24 francs français.)

In German.

1935 621. (02
BBEL (H.).
Taschenbuch für den Maschinenbau.
Berlin, Julius Springer. 2 Bände, 1 720 Seiten und ra 3 000 Textfiguren. (Preis : 22.50 R. M.)

1934 62. (02
TTE.
Des Ingenieurs Taschenbuch.
Berlin, Wilhelm Ernst und Sohn. 1 Band. 1 204 Sei- . (Preis : 16.50 R. M.)

1935 656. 221
MÜLLER (W.).
Neuere Methoden für die Betriebsuntersuchungen der Bahnanlagen.
Berlin, Julius Springer. 1 Band, 45 Seiten, 7 Tafeln und 37 Textabbildungen. (Preis : 5.80 R. M.)

1935 536
NETZ (H.).
Wärmewirtschaft.
Leipzig und Berlin, B. G. Teubner. 1 Band, 94 Seiten und 86 Abbildungen. (Preis : 5 R. M.)

1935 691 & 721 .9
RITTER (M.).
Tabellen zur Berechnung von Eisenbeton-Konstruktionen nach den schweizerischen Normen 1935.
Zurich, Leemann und Co. (Preis : 12 schw. Franken.)

In English.

1935 621. 43
BRIAN REED.
Diesel Locomotives and Railcars.
One vol. (8 3/4 × 5 1/2 inches) of 190 pages, with 131 illustrations. 1935, London E. C. 4., The Locomotive Publishing Company Ltd., 3, Amen Corner. (Price : 6 sh. net.)

1935 693
FILIPPI (H.).
Brick engineering, vol. III. — Reinforced brick masonry.
Cleveland (Ohio). Published by the Brick Manufacturers Association of America. (6 × 8 inches), 240 pages, photographs, diagrams and tables. (Price : $ 2.00.)

1935 624 .2
GEDO (J. D.).
Theory of superstatic structures.
New York. Published by the Author, 205 E. 42nd. Street (8 × 11 inches), 98 pages, tables, folding diagrams. (Price : $ 4.50.)

[1] The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress jointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. Weissenbruch, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 1509).

1935 **62 (01 & 624 (02**

INGLIS (C. E.).

A mathematical treatise on vibrations in railway bridges.

Cambridge (England). The University Press. New York. Macmillan & Co. (7 × 11 inches), 203 pages, line drawings and tables. (Price : $ 7.50.)

1935 **656. 1 & 656. 2**

LONG (W. Rodney).

Railway and highway transportation abroad. — A study of existing relationships, recent competitive measures, and co-ordination policies.

Washington. United States Department of Commerce, Government Printing Office. (9 × 5 3/4 inches), 426 pages. (Price : 50 cents.)

1935 **62. (01 & 693**

TORRES (A. F.) & ROMANO (R. de L.).

A method for the mechanical testing of cements.

Sao Paulo (Brazil). — Published by the Institute for Technological Research. (7 × 10 inches), 53 pages, tables and diagrams.

1935 **694 (02**

Wood structural design data. — Vol. 1.

Washington, D. C. Published by National Lumber Manufacturers Association. (9 × 11 inches), 296 pages, chiefly tables. (Price : $ 1.00.)

In Spanish.

1935 **313 .385 (.82)**

Estadística de los Ferrocarriles en explotación en la República Argentina. Año 1933.

Buenos Aires, Talleres Gráficos del Ministerio de Obras Públicas. 1 volumen, 378 páginas.

In Italian.

1935 **624 .63**

SANTARELLA (L.).

La scuola di specializzazione per le costruzioni in cemento armato (1928-1933). Il compartamento elastico di ponti ferroviari in cemento armato.

Bologna, L. Cappelli. 1 volume, 72 pagine e tavole. (Prezzo : L. 10.)

[016. 385. (05]

II. — PERIODICALS.

In French.

Annales des ponts et chaussées. (Paris.)

1935 **624 .63 (.45)**

Annales des Ponts et Chaussées, février, p. 207.

CAZES. — Note sur la construction d'un **pont en béton armé** sur le Lot, à Luzech. (6 500 mots & fig.)

1935 **691 (.44)**

Annales des Ponts et Chaussées, mars, p. 505.

Instructions relatives à **l'emploi du béton armé dans les ouvrages** dépendant du Ministère des Travaux Publics de France et commentaires explicatifs. (9 000 mots.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

1935 **62. (01**

Bull. de la Soc. d'encouragement pour l'ind. nat., avril, p. 218.

GUILLERY (R.). — **Nouvelles machines d'essai.** (3 700 mots & fig.)

Bulletin de l'Association internationale permanente des Congrès de la route (Paris.)

1935 **656 (.64)**

Bull. de l'Ass. intern. perman. des Congrès de la route, mars-avril, p. 110.

NORMANDIN (A.). — **L'activité du service des travaux publics du Maroc. (Les routes, le rail et la route.)** (1 800 mots & 2 cartes.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1935 **313 .385 (.436)**

Bull. des transp. intern. par ch. de fer, avril, p. 165

Statistique des chemins de fer autrichiens pour les années 1929 à 1932. (1 400 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1935 **656 (.494)**

Bull. techn. de la Suisse romande, N° 10, 11 mai, p. 114

BIERMANN (C.). — **Les transports en commun** dans le Canton de Vaud. (800 mots & fig.)

1935 **694**

Bull. techn. de la Suisse romande, N° 11, 25 mai. p. 125

La mesure de la siccité des bois. (3 300 mots & fig.)

Chronique des transports. (Paris.)

1935 **385 .113 (.44)**

Chronique des transports, N° 9, 10 mai, p. 9.

La Compagnie des **Chemins de fer du Midi en 1934** (6 000 mots.)

Génie civil. (Paris.)

1935 **62. (01**

énie civil, N° 2753, 18 mai, p. 490.

LARRAS (J.). — Note sur l'utilisation des quantités mplexes pour la solution de certains problèmes de sistance des matériaux. (1 200 mots & fig.)

1935 **693**

énie civil, N° 2753, 18 mai, p. 492.

Les peintures à l'aluminium, pour la protection des nstructions métalliques. (1 000 mots.)

1935 **656 .201 (.44)**

nie civil, N° 2753, 18 mai, p. 493.

Les agrandissements de la gare à voyageurs de ontpellier. (1 200 mots & fig.)

1935 **62. (01 & 621 .392**

nie civil, N° 2754, 25 mai, p. 513.

DUQUENOY (M.). — Expériences sur la soudure ut à bout de tôle d'acier. (2 100 mots & fig.)

1935 **624 .52 (.73)**

nie civil, N° 2754, 25 mai, p. 516.

Le pont de San Francisco à Oakland (Californie). 00 mots & fig.)

1935 **656 .257**

nie civil, N° 2754, 25 mai, p. 518.

Manœuvre des transmissions mécaniques d'un poste iguillage par servo-moteurs à huile sous pression. 00 mots & fig.)

---

s Chemins de fer et les Tramways. (Paris.)

1935 **621 .43 (.73)**

s Chemins de fer et les Tramways, mai, p. 112.

SPIESS (E.). — Le Flying Yankee (10 000 mots fig.)

1935 **621 .43**

s Chemins de fer et les Tramways, mai, p. 1.

Automotrices et locomotives Diesel « Frichs ». (5 000 ts & fig.)

1935 **621 .43 & 625 .215**

s Chemins de fer et les Tramways, mai, p. 123.

Bogie pour automotrice. (700 mots & fig.)

1935 **621 .43 (.44)**

s Chemins de fer et les Tramways, mai, p. 124.

Automotrice Dunlop-Fouga. (5 500 mots & fig.)

1935 **625 .212**

Les Chemins de fer et les Tramways, mai, p. 128.

La roue légère en alliage de magnésium. (1 300 mots.)

1935 **656 .254**

Les Chemins de fer et les Tramways, mai, p. 131.

DUCHESNOY. — Pétards spéciaux pour autorails. (600 mots & fig.)

1935 **656 .212 (.44)**

Les Chemins de fer et les Tramways, mai, p. 132.

GLATIGNY. — Améliorations de la gare d'Achères. (2 000 mots & fig.)

1935 **656 .251 (.44)**

Les Chemins de fer et les Tramways, mai, p. 134.

VIE (G.). — La modernisation des signaux sur les réseaux français. (3 400 mots & fig.)

L'Ossature métallique. (Bruxelles.)

1935 **621 .392 & 624 .2**

L'Ossature métallique, avril, p. 206.

BRYLA (St.) & CHMIELOWIEC (Al.). — Influence des semelles soudées aux ailes des poutrelles I sur leur résistance à la flexion. (2 800 mots, 10 tableaux & fig.)

Revue générale des chemins de fer. (Paris.)

1935 **625 .4 (.44)**

Revue Générale des chemins de fer, mai, p. 454.

FAUCONNIER. — Chemin de fer métropolitain de Paris. L'équipement de la ligne n° 11 de la Place du Châtelet à la Porte des Lilas. (11 500 mots & fig.)

1935 **621 .132.3 (.44)**

Revue Générale des chemins de fer, mai, p. 481.

REGNAULD. — La locomotive Pacific S. 16 à grande vitesse du réseau d'Alsace et de Lorraine. (5 700 mots & fig.)

1935 **625 .111 (.44)**

Revue Générale des chemins de fer, mai, p. 518.

Remaniement du système ferroviaire de la traversée de la ville de Nantes avec suppression des passages à niveau. (1 400 mots.)

Revue universelle des mines. (Liége)

1935 **62. (01**

Revue universelle des mines, mai, p. 228.

FOULON (E.). — Influence de la courbure des pièces sur leurs tensions, leur potentiel élastique et leurs éléments hyperstatiques. (800 mots & fig.)

In German.

Die Lokomotive. (Wien.)

1935 **621 .132.3 (.44)**

Die Lokomotive, Mai, S. 77.

MÜNCHEN (J. A.). — Die **2C2-Stromlinien-Lokomotive** der Deutschen Reichsbahn Gesellschaft. (1 900 Wörter und Abb.)

Elektrische Bahnen. (Berlin.)

1935 **621 .33 (.43)**

Elektrische Bahnen, Heft 4, April, S. 83.

GEYER. — Zur **Eröffnung der elektrisch betriebenen Strecke Augsburg-Nürnberg.** (1 500 Wörter.)

1935 **621 .331 (.43)**

Elektrische Bahnen, Heft 4, April, S. 85.

EGER. — Das **Unterwerk** Grönhart. (1 700 Wörter und Abb.)

1935 **621 .332 (.43)**

Elektrische Bahnen, Heft 4, April, S. 93.

NADERER (G.). — Die fahrbaren **Unterwerke.** (2 900 Wörter und Abb.)

1935 **621 .33 (.43) & 625 .1 (.43)**

Elektrische Bahnen, Heft 4, April, S. 118.

WEBER. — **Bauliche Änderungen an der Strecke Augsburg-Nürnberg** anlässlich der Einrichtung des elektrischen Zugbetriebes. (1 900 Wörter und Abb.)

Glasers Annalen. (Berlin.)

1935 **626 (.493)**

Glasers Annalen, Heft 8, 15. April, S. 61.

GEISSLER (O.). — Vom **Bau des Albert-Kanals,** Strecke Haccourt-Lanaeken. (3 500 Wörter und Abb.)

1935 **621 .43**

Glasers Annalen, Heft 9, 1. Mai, S. 69.

KINKELDEI (L.). — Theoretische Berechnung der **Anfahrbeschleunigung von Dieseltriebwagen** mit Flüssigkeitsgetrieben bei angenommener Wirkungsgradkurve. (3 400 Wörter und Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1935 **621 .133.2**

Organ für die Fortschritte des Eisenbahnwesens, Heft 9, 1. Mai, S. 25.

BLOMBERG (H.). — Beitrag zur Frage der **Erkaltungsundichtigkeit von Stehbolzen in der Lokomotivfeuerbuchse.** (3 200 Wörter, 4 Tabelle und Abb.)

1935 **625 .245 (.439)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 9, 1. Mai, S. 162.

PFEIFFER (K.). — Neue **Spezialgüterwagen** der Ungarischen Staatseisenbahnen. (2 400 Wörter und Abb.)

1935 **624 .63**

Organ für die Fortschritte des Eisenbahnwesens, Heft 9, 1. Mai, S. 165.

SCHAECHTERLE (K.) — Querbewehrung bei **Brükken mit einbetonierten Trägern** (Verbundbrücken) (700 Wörter.)

1935 **656 .1 (.43) & 656 .261 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 7/8, 10. April, S. 140.

SCHULTKEISS. — Erfahrungen mit dem **Culemeyerstrassenfahrzeug** für Eisenbahnwagen. (2 200 Wörter und Abb.)

1935 **656 .225 & 656 .261**

Organ für die Fortschritte des Eisenbahnwesens, Heft 7/8, 10. April, S. 143.

HASSFURTER. — **Behälter-Verkehr.** (1 000 Wörter und Abb.)

1935 **625 .14 (01**

Organ für die Fortschritte des Eisenbahnwesens, Heft 10, 15. Mai, S. 173.

ADLER (A.). — Über den Einfluss von **Bahn- und Fahrzeug-Unregelmässigkeiten** auf das Gleis. (1 500 Wörter und Abb.)

1935 **625 .143.4 & 625 .144.2**

Organ für die Fortschritte des Eisenbahnwesens, Heft 10, 15. Mai, S. 175.

BLOSS. — Unstetigkeiten der **Krümmung am Laschenstoss.** (1 000 Wörter und Abb.)

1935 **625 .15**

Organ für die Fortschritte des Eisenbahnwesens, Heft 10, 15. Mai, S. 177.

SEIFERT. — **Abstecken von Kreisbogenweichen** jeder Form. (1 000 Wörter.)

1935 **625 .13 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 10, 15. Mai, S. 178.

POTTHOFF (G.). — Beobachtungen und Untersuchungen beim Abbruch des **Oberauer Tunnels.** (3 500 Wörter und Abb.)

1935 **625 .14**

Organ für die Fortschritte des Eisenbahnwesens, Heft 10, 15. Mai, S. 183.

STÜBEL. — **Prüfung von Gleisschotter** auf Widerstandsfähigkeit gegen Schlagbeanspruchung. (1 500 Wörter und Abb.)

1935 **656 .251 (.43**

Organ für die Fortschritte des Eisenbahnwesens, Heft 10, 15. Mai, S. 186.

FREYSS. — Das **neue Signalbuch** der Deutschen Reichsbahn. (1 500 Wörter und Abb.)

1935 621 .33 (.485)
gan für die Fortschritte des Eisenbahnwesens, Heft 11, 1. Juni, S. 191.
ÖFVERHOLM (J.). — **Die Elektrisierung** der Schwe-schen Staatsbahnen. (4 400 Wörter und Abb.)

1935 656 .254 (.485)
gan für die Fortschritte des Eisenbahnwesens, Heft 11, 1. Juni, S. 200.
HARD (T.). — Schwedische **Schutzvorrichtungen an egübergängen** in Schienenhöhe. (1 400 Wörter und ɔb.)

1935 625 .232 (.485)
gan für die Fortschritte des Eisenbahnwesens, Heft 11, 1. Juni, S. 202.
KÖHLER (C. von). — **Schlafwagen 3. Klasse** der hwedischen Staatsbahnen. (700 Wörter und Abb.)

itschrift des Vereines Deutscher Ingenieure. (Berlin.)

1935 624 .32 (.489)
tsch. des Ver. deutsch. Ing., Nr. 19, 11. Marz, S. 563.
SCHAPER (G.). — Die **Brücke** über den Kleinen lt. (1 900 Wörter und Abb.)

1935 621 .43 (.43)
itsch. des Ver. deutsch. Ing., Nr. 20, 18. April, S. 613.
WITTE (F.). — **Zweikraftlokomotive für Verschie-dienst.** (600 Wörter und Abb.)

1935 621 .31
itsch. des Ver. deutsch. Ing., Nr. 21, 25. Mai. S. 639.
PUTZ (W.). — Betriebseigenschaften von **Elektro-toren.** (4 200 Wörter und Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

1935 656 .254 (.43)
tschrift für das gesamte Eisenbahn-Sicherungsw., Nr. 6, 1. Mai, S. 61.
LÜTGERT. — Die **selbsttätigen Warnanlagen an egübergängen** bei der Deutschen Reichsbahn. (2 900 rter. 2 Tafeln und Abb.) (Fortsetzung folgt.)

1935 625 .162 (.43)
tschrift für das gesamte Eisenbahn-Sicherungsw., Nr. 7, 20. Mai, S. 77.
BUDDENBERG. — Die **Reichsbahnschranke.** (1 500 rter und Abb.) (Fortsetzung folgt.)

Zeitung des Vereins mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1935 385 .52 (.43)
tung des Vereins mitteleurop. Eisenbahnverw., Nr. 16, 18. April, S. 317.
HIRSCH. — Die neue Gedingeordnung für die **Bahn-erhaltung** unter besonderer Berücksichtigung der nbedingungen. (5 500 Wörter.)

1935 656 .224 (.42)
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 16, 18. April, S. 324.
Der **Inlandverkehr der Englischen Post.** (2 700 Wörter und Abb.)

1935 656 .2
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 18, 2. Mai, S. 357.
BLUM. — Die « **Leistungsfähigkeit** » **des Verkehrs.** (3 200 Wörter.)

1935 621 .137
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 19, 9. Mai, S. 386.
DETTE. — Ein Kleinturbogenerator für **Lokomotiv-beleuchtung.** (900 Wörter und Abb.)

1935 656 .222.5
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 20, 16. Mai, S. 397.
URBAN. — Aufgaben und Ziele des **Personenzug-fahrplans.** (8 200 Wörter.)

1935 621 .33 (.43)
Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 20, 16. Mai, S. 407.
FROENAU. — **Elektrischer Zugbetrieb** auf der Strecke Augsburg-Nürnberg. (900 Wörter.)

In English.

Bulletin, American Railway Engineering Association. (Chicago.)

1934 656 .2 (.73)
Bull., Amer. Ry. Engineering Assᵒⁿ, December, p. 245.
Report of Committee on **Economics of railway operation.** — Methods for obtaining a more intensive use of existing railway facilities. — Methods for determining most economical train length, considering all factors entering into transportation costs, etc.

1934 625 .14 (.73), 625 .15 (.73) & 625 .17 (.73)
Bull., Amer. Ry. Engineering Assᵒⁿ, December, p. 267.
Report of Committee on **maintenance of way work equipment.** — Developments in design of railway motor cars. — Use and adaptability of track type tractors in maintenance of way work. — Use of ballast discers. — Track welding equipment. — Information for welders. — Precision instruments for measuring rail end batter.

1934 625 .12 (.73) & 625 .16 (.73)
Bull., Amer. Ry. Engineering Assᵒⁿ, December, p. 303.
Report of Committee on **roadway.** — Landslides, subsidences and rock-falls. — Service life of and specifications for railway fence wire. — Widening roadbed under traffic. — Bearing power and other physical properties of soils, including effect upon roadbed. — Jacking culvert pipe through fills. — Methods of protection against drifting sand.

1934 **385 .587 (.73) & 625 .17 (.73)**

Bull., Amer. Ry. Engineering Asson, December, p. 343.

Report of Committee on **economics of railway labor.** — Analysis of operations of railways that have made marked progress in reduction of labor required in maintenance of way work. — Gang organization and methods of performing the more common tasks of maintenance of way work, etc.

1934 **691 (.73) & 693 (.73)**

Bull., Amer. Ry. Engineering, Asson, December, p. 375.

Report of Special Committee on **waterproofing of railway structures.** — Principles governing the use of waterproofing or dampproofing of railway structures. — Discussion on bituminous emulsions.

1934 **621 .39 (.73)**

Bull., Amer. Ry. Engineering Asson, December, p. 381.

Report of Committee on **electricity.** — Synopsis of reports of Electrical Section.

1935 **656 .237 (.73) & 657 (.73)**

Bull., Amer. Ry. Engineering Asson, January, p. 383.

Report of Committee on **records and accounts.** — Bibliography on subjects pertaining to records and accounts. — Office and drafting room practices. — System of reports and records required to budget and control maintenance of way expenses. — Methods and forms for gathering data for keeping up to date the property records of railways with respect to valuation, accounting, depreciation and other requirements, etc. (13 500 words, tables and fig.)

1935 **65 (.73)**

Bull., Amer. Ry. Engineering Asson, January, p. 439.

Report of Committee on **standardization.** — Status of A.A.R. recommended standards for railroad highway grade crossing protection. — Standards approved by American Standards Association, etc. (8 500 words.)

1935 **621 .142.2 (.73) & 691 (.73)**

Bull., Amer. Ry. Engineering, Asson, January, p. 455.

Report of Committee on **wood preservation.** — Service test records for treated ties. — On the service life of beech ties impregnated with creosote, by Dr. Hermann von Schrenk. — Piling used for marine construction. — Destruction by termites and possible ways of prevention. — Incising of all forest products material. — Investigations being made for the determination of toxicity value of creosote and creosote mixtures. (25 000 words.)

1935 **313 .625 .143.3 (.73) & 625 .143 (.73)**

Bull., Amer. Ry. Engineering Asson, January, p. 518.

Report of Committee on **rail.** — Further research, including details of mill practice. — Rail failure statistics for 1933. — Transverse fissure statistics. — The A.A.R. detector car. — Economic value of different sizes of rail. — Design joint bars for R. E. rail sections as developed A.R.E.A. joint bar for 131-lb. R. E. rail. — Outline method for conducting service tests of the various types of joint bars. (9 000 words, tables and fig.)

1935 **625 .14 (.73), 625 .15 (.73) & 625 .17 (.73)**

Bull., Amer .Ry. Engineering Asson, January, p. 555.

Report of Committee on **track.** — String lining of curves by chord method and preparation of tables suitable for use of trackmen. — Plans and specifications for track tools. — Plans for switches, frogs, crossings, slip switches, etc. — Design of tie plates for R. E. rail sections as developed. — Design and specifications for anti-creepers for R. E. rail sections, etc. (7 000 words, tables and fig.)

1935 **725 .3 (.73)**

Bull., Amer. Ry. Engineering Asson, January, p. 579.

Report of Committee on **buildings.** — Preparation of specifications for railway buildings. — Vermin and ratproofing in buildings. — Mill type and other heavy wood construction for railway buildings, etc. (20 000 words, tables and fig.)

1935 **624 (.73) & 69 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 631.

Report of Committee on **iron and steel structures.** — Specifications for steel railway bridges, for fixed spans not exceeding 400 feet in length (1935). — Tests of steel columns and formulas for design. — Bearing value of small rollers. — Change in grade of structural steel. — Elastic stability of plates subjected to compression and shear. — Shears on column lacing. — Live loads for multiple track bridges. — Live loads and unit steel railway bridges. — Net section of riveted tension members. (45 000 words, tables and fig.)

1935 **624 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 781.

Report of Committee on **wooden bridges and trestles.** — Simplification of grading rules and classification of timber for railway uses. — Overhead wooden or combination wooden and metal highway bridges. — Design of wooden trestles for heavy loadings. — Improved design of timber structures to give longer life with lower cost of maintenance. (18 000 words, tables and fig.)

1935 **69 (.73) & 72 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 839.

Specifications and principles of design of plain and reinforced concrete. — Progress in the science and art of concrete manufacture. — Specifications for foundations. — Methods and practices of lining and relining tunnels. — Specifications for pneumatically projected concrete or mortar. — Design of expansion joints involving masonry structures. — Study of specifications for overhead highway bridges (14 500 words, tables and fig.)

1935 **625 .162 (.73), 625 .165 (.73) & 656 .259 (.73)**

Bull., Amer. Ry. Engineering Asson, February, p. 872.

Report of Committee on **highways.** — Comparative merits of various types of grade crossing protection. — Action taken by various governmental bodies in the United States and Canada for the control and taxation of traffic over highways. (5 800 words and fig.)

1935 625 .113 (.73)
ull., Amer. Ry. Engineering Asson, February, p. 911.
Supplemental report of Committee on track. — levation of curves. (700 words and tables.)

1935 656 .25 (06 (.73)
ull., Amer. Ry. Engineering Asson, March, p. 1.
Program, thirty-sixth annual convention and year ook. — Numerical list of members and alphabetical st of members.

Engineer. (London.)

1935 624 .32 (.41)
ngineer, No. 4137, April 26, p. 428; No. 4138, May 3, p. 454.
Craigavon bridge, Londonderry, Northern Ireland. 900 words and fig.)

1935 656 .211.7 (.42)
ngineer, No. 4137, April 26, p. 437.
ABELL (W.). — Train ferry steamers for the South- n Ry. (1 400 words and fig.)

1935 62. (01 & 693
ngineer, No. 4137, April 26, p. 442.
DAVEY (N.). — Measuring the existing stresses in asonry structures. (2 000 words and fig.)

1935 621 .2 & 621 .43
gineer, No. 4138, May 3, p. 460, p. 466.
SINCLAIR (H.). — Recent developments in hydrau- couplings. (6 500 words.) — Abstract of a paper esented at the Institution of Mechanical Engineers d discussion.

1935 62. (01 (.42) & 669 .1 (06 (.42)
gineer, No. 4139, May 10, p. 482.
The Iron and Steel Institute. — Corrosion. — Iron le. — Determination of oxides in steel. (7 800 rds.)

1935 621 .1 & 621 .43
gineer, No. 4139, May 10, p. 486.
Torque converters. (1 300 words.)

1935 669 (06 (.42)
gineer, No. 4139, May 10, p. 492.
CARPENTER (H. C. H.). — Alloys. — Old and new. 300 words.)

1935 621 .2 & 621 .43
gineer, No. 4139, May 10, p. 494.
HAHN (W.). — Voith turbo-transmissions. — Abs- ct of a paper presented at the Institution of Me- nical Engineers. (1 300 words and fig.)

1935 621 .95 (.42)
gineer, No. 4139, May 10, p. 495.
ocomotive rod boring and trepanning machine. (350 rds and fig.)

Engineering. (London.)

1935 621 .15
Engineering, No. 3615, April 26, p. 431.
GILLFORD (F. H.). — Early traction engines. (3 200 words and fig.)

1935 621 .33 (.81)
Engineering, No. 3615, April 26, p. 444.
Railway electrification in Brazil. (600 words and fig.)

1935 656 .211.7 (.42)
Engineering, No. 3615, April 26, p. 448.
Train ferry steamers for the Southern Railway. (1 000 words.)

1935 62. (01 (.42) & 669 .1 (06 (.42)
Engineering, No. 3616, May 3, p. 460.
The corrosion of iron and steel. Report presented at the Annual Meeting of the Iron and Steel Institute, May 1, 1935. (1 500 words.)

1935 621 .2 & 621 .43
Engineering, No. 3616, May 3, p. 462, p. 473.
Recent developments in hydraulic couplings, by Harold SINCLAIR. — Paper read before the Institution of Mechanical Engineers, April 26, 1935. (Paper and discussion.) (9 600 words and fig.)

1935 62. (01 & 669 .1
Engineering, No. 3616, May 3, p. 476.
COKER (E. G.) & HAIGH (B. P.). — An experimental investigation of cracking in mild-steel plates and welded seams. (3 400 words and fig.)

Engineering News-Record. (New York.)

1935 62. (01 & 624 .2
Engineering News-Record, No. 13, March 28, p. 446.
SPOFFORD (C. M.) & GIBBONS (C. H.). — Weighing bridge reactions with proving rings. (2 700 words and fig.)

1935 625 .1 (.73) & 625 .3 (.73)
Engineering News-Record, No. 13, March 28, p. 450.
STEVENS (J. F.). — An engineer's recollections. — II. — Canadian Pacific Railway location in the Rocky Mountains. (1 800 words and fig.)

1935 62 (.∞)
Engineering News-Record, No. 13, March 28, p. 452.
Engineering in foreign countries. (1 600 words and fig.)

1935 624. (0 & 721 .6
Engineering News-Record, No. 14, April 4, p. 484.
HARDESTY (S.). — Designing composite steel and concrete bridge slabs. (1 900 words, tables and fig.)

1935 **625 .13 (.73)**
Engineering News-Record, No. 15, April 11, p. 509.
Driving a difficult tunnel in soft ground. (5 600 words and fig.)

1935 **385. (091 (.71) & 625 .1 (.71)**
Engineering News-Record, No. 15, April 11, p. 521.
STEVENS (J. F.). — An engineer's recollections. — III. — Work on the C. P. R. West through the Gold Range. (3 500 words and fig.)

1935 **627 (.73) & 693 (.73)**
Engineering News-Record, No. 16, April 18, p. 543.
ALEXANDER (J. B.) & COMESS (S.). — **Concreting plant and methods on Mississipi river locks.** (2 500 words and fig.)

1935 **624 (0 (.73) & 624 .51 (.73)**
Engineering News-Record, No. 16, April 18. p. 547.
Aluminium trusses and floor for Brooklyn bridge. (2 800 words and fig.)

1935 **624 .52 (.44)**
Engineering News-Record, No. 17, April 25, p. 577.
BRETTING (A. E.). — **Inclined hangers impart slenderness to ribs of 470-ft. concrete arch.** (2 300 words and fig.)

1935 **385 (091 (.73) & 625 .1 (.73)**
Engineering News-Record, No. 17, April 25, p. 591.
STEVENS (J. F.). — An engineer's recollections. — IV. — **Winter work** on the South Shore Railroad. (2 900 words and fig.)

1935 **62 (.∞)**
Engineering News-Record, No. 17, April 25. p. 596.
Engineering in foreign countries. (2 500 words and fig.)

Great Western Railway Magazine. (London.)

1935 **625 .232 (.42)**
Great Western Ry. Magazine, May. p. 253.
New G. W. R. **centre-vestibule trains** for excursions. (1 000 words and fig.)

Journal, Institute of Engineers, Australia. (Sydney, N. S. W.)

1935 **627**
Journal, Institute of Engineers, Australia, March, p. 93.
ANDRES (F.). — Notes on the development of **quay walls.** (5 300 words and fig.)

1935 **624 .2**
Journal, Institute of Engineers, Australia, March. p. 99.
BURN (A.). — Simplified calculations for **composite beam bridges.** (1 700 words and fig.)

Journal, Permanent Way Institution.

1935 **625 .4**
Journal, Permanent Way Institution, April, p. 11.
London Underground Railways. — Some features of engineering interest. (Address of the retiring President.) (3 400 words.)

1935 **625 .1 (0**
Journal, Permanent Way Institution, April, p. 64.
SHERRINGTON (C. E. R.). — Ten years of progress in **permanent way** practice abroad. (5 500 words.)

1935 **621 .392**
Journal, Permanent Way Institution, April, p. 81.
PANNELL (J. P. M.). — The application of **arc welding** to permanent way work. (10 000 words and fig.)

1935 **625 .173**
Journal, Permanent Way Institution, April, p. 113.
BOYD (D.). — **Permanent way relaying costs.** (7 400 words and fig.)

London & North Eastern Railway Magazine. (London.)

1935 **621 .138.1**
London & North Eastern Ry. Mag., May, p. 260.
MUSGRAVE (G. A.). — **Sand-drying appliances.** — Old and new, Scottish area. (1 000 words and fig.)

Modern Transport. (London.)

1935 **621 .33 (.81)**
Modern Transport, No. 840, April 20, p. 3.
Electrification of Central Railway of Brazil. (3 400 words and fig.)

1935 **347 .763 (.42) & 656 .1 (.42)**
Modern Transport, No. 840, April 20. p. 4.
Future of road transport industry. — Discussion at Institute of Transport of Mr. J. S. NICHOLL'S paper on the « Road and Rail Traffic Act, 1933 » (2 500 words.)

1935 **656 .21 (.42) & 725 .31 (.42)**
Modern Transport. No. 840. April 20. p. 5.
Rebuilding of Fenchurch Street Station. — L.N.E.R. scheme completed. (2 500 words.)

1935 **621 .131.2 (.44) & 656 .222.1 (.44)**
Modern Transport. No. 840. April 20. p. 6.
Streamlined trains in France. — Interesting test on P. L. M. (650 words and fig.)

1935 **625 .232 (.73)**
Modern Transport. No. 841. April 27. p. 3.
New **ten-coach trains** for G. W. Ry. excursionists (1 200 words and fig.)

1935 **656 .254**
odern Transport, No. 841, April 27, p. 5.
PRESCOTT (C. W.). — New methods in **train con-**
ol. — The track speed indicator system. (3 200
rds and fig.)

1935 **621 .131.3 (.45)**
odern Transport, No. 841, April 27, p. 9.
Testing of locomotives. Plant at Vitry. (1 400
rds and fig.)

1935 **625 .4 (.42) & 656 .211 (.42)**
odern Transport, No. 842, May 4, p. 3.
New **tube station** at Leicester Square. (2 000 words
l fig.)

1935 **336 .2 (.42) & 656 .1 (.42)**
odern Transport, No. 842, May 4, p. 6.
HUTCHINSON (E. B.). — **Motor vehicle taxation.**
No. 3. — Factors in a scientific scheme. (1 000
rds.)

1935 **656 .1 (09 (.42)**
Modern Transport, No. 842, May 4, p. 7.
Road transport in the present reign. Rapid evolu-
n in design and construction. (2 300 words.)

---

oceedings, American Society of Civil Engineers. (New York.)

1935 **62. (01 & 624 .2**
oceed., Amer. Soc. of Civil Engineers, April, p. 469.
LYSE (I.) & JOHNSTON (B. G.). — **Structural**
ms in torsion. (15 000 words and fig.)

Railway Age. (New York.)

1935 **656 .211 (.73) & 725 .31 (.73)**
ilway Age, No. 13, March 30, p. 485.
Pennsylvania opens new **passenger station** at Ne-
rk, N. Y. (6 400 words and fig.)

1935 **625 .244 (.73)**
lway Age, No. 13, March 30, p. 492.
GORMAN (E. A.). — **Fan circulation improves effec-**
eness of refrigerator cars. (2 400 words and fig.)

1935 **385 .1 (.73)**
lway Age, No. 13, March 30, p. 497.
The story of the December 1 issue which focused
ion-wide attention upon the dependence of national
overy on the revival of the railway and durable
ds industries. (6 200 words.)

1935 **624 .8 (.73)**
lway Age, No. 14, April 6, p. 525.
Three-track vertical-lift bridge has unusual features.
200 words and fig.)

1935 **621 .13, 625 .2 & 659**
Railway Age, No. 14, April 6, p. 529.
Locomotives, cars and public relations. (5 000
words.)

1935 **656 .254 (.73) & 656 .255 (.73)**
Railway Age, No. 14, April 6, p. 538.
Centralized traffic control on the Texas and Pacific.
(1 400 words and fig.)

1935 **625 .232 (.73) & 625 .235 (.73)**
Railway Age, No. 14, April 6, p. 540.
Lackawanna exhibits **aluminum-finished train.** (800
words and fig.)

1935 **625 .232 (.73)**
Railway Age, No. 15, April 13, p. 562.
Light-weight coaches delivered to Boston and Maine.
(2 800 words and fig.)

1935 **625 .13 (.73)**
Railway Age, No. 15, April 13, p. 572.
Pennsylvania builds large **double-track tunnel** at
Baltimore. (5 000 words and fig.)

1935 **385 .15**
Railway Age, No. 15, April 13, p. 579.
FLETCHER (R. V.). — **Government ownership in**
theory and practice. (4 600 words.)

1935 **621 .43 (.73)**
Railway Age, No. 15, April 13, p. 600.
Twin Zephyrs placed in service. (3 600 words and
fig.)

1935 **624. (0 & 625 .13**
Railway Age, No. 15, April 13, p. 605.
Reading bridge has unusual floor construction. (1 500
words and fig.)

1935 **388 (.42)**
Railway Age, No. 16, April 20, p. 607.
LLOYD WILSON (G.). — **Private ownership, public**
operation. (4 300 words.)

Railway Engineering and Maintenance. (New York.)

1935 **621 .144.4**
Railway Engineering and Maintenance, April, p. 216.
Claw bars, lining bars, tamping bars, can they be
standardized. (4 000 words and fig.)

1935 **625 .143.4 (.73), 625 .173 (.73) & 665 .882 (.73)**
Railway Engineering and Maintenance, April, p. 221.
O' ROURKE (G. M.). — Flatter vs. grinder in gas
rail welding. (1 900 words and fig.)

1935 **624 .31 & 624 .91**
Railway Engineering and Maintenance, April, p. 224.
BYRD (L. G.). — **Preframing proves practical.** (1 400 words and fig.)

1935 **721 .5 (.73)**
Railway Engineering and Maintenance, April, p. 226.
ROOFS. — How Dutch-lap asbestos shingles are laid.

Railway Gazette. (London.)

1935 **625 .17**
Railway Gazette, No. 15, April 12, p. 687.
HULL (Lt. Col.). — Railway maintenance problems. — IV. — **Abutments, wing walls, and bedstones.** (2 400 words and fig.)

1935 **621 .131.1 & 621 .131.2**
Railway Gazette, No. 15, April 12, p. 691.
DIAMOND (E. L.). — **The horse-power of locomotive its calculation and measurement.** (3 900 words and fig.)

1935 **347 .763 (.42) & 656 .1 (.42)**
Railway Gazette, No. 15, April 12, p. 696.
The influence of the **Road-Rail Traffic Act** on goods transport by road. (1 200 words.)

1935 **656 .261 (.42)**
Railway Gazette, No. 15, April 12, p. 697.
Railway motor vehicles for departmental work. (900 words, tables and fig.)

1935 **625 .214 (.42) & 625 .26 (.42)**
Railway Gazette, No. 15, April 12, p. 703.
New **axlebox repair layout** at Swindon Works, Great Western Ry. (1 500 words and fig.)

1935 **385. (091 (.943)**
Railway Gazette, No. 16, April 19, p. 727.
ARTHURTON (A. W.). — Impressions of overseas transport. — XVII. — A survey of the methods by which the Queensland Government Railways have promoted the economic and social development of the State. (1 200 words.)

1935 **621 .134.3**
Railway Gazette, No. 16, April 19, p. 728.
LOMONOSSOFF (G. V.). — **Superheating on locomotive.** (1 000 words and fig.)

1935 **625 .143.2 (.42)**
Railway Gazette, No. 16, April 19, p. 729.
Revised B. E. S. A. rail. (550 words.)

1935 **621 .131.3 (.44) & 656 .222.1 (.44)**
Railway Gazette, No. 16, April 19, p. 730.
French locomotive trials. (2 400 words and fig.)

1935 **625 .3 (.42)**
Railway Gazette, No. 16, April 19, p. 734.
CLEAVER (C. F.). — **The Dinorwic Slate Quarry Railway.** (2 500 words and fig.)

1935 **621 .132.3 (.73)**
Railway Gazette, No. 16, April 19, p. 738.
The latest Baltimore and Ohio **high-speed locomotive** (500 words and fig.)

1935 **625 .176 (.94)**
Railway Gazette, No. 17, April 26, p. 775.
ARTHURTON (A. W.). — Impressions of overseas transport. — XVIII. — **The gauge problem in Australia.** (1 200 words.)

1935 **385. (09 (.493)**
Railway Gazette, No. 17, April 26, p. 777.
Centenary of the Belgian Railways. (4 200 words and fig.)

1935 **625 .232 (.42)**
Railway Gazette, No. 17, April 26, p. 790.
New excursion trains, Great Western Railway. (90 words and fig.)

1935 **625 .232 (.42)**
Railway Gazette, No. 17, April 26, p. 792.
New first class club car, L. M. S. Ry. (2 000 word and fig.)

1935 **621 .131.3 (.44**
Railway Gazette, No. 17, April 26, p. 797.
Locomotive testing plant, Vitry. (1 000 words.)

1935
Railway Gazette, No. 18, May 3, p. 849.
One hundred years of railway publishing. — A brief history of « The Railway Gazette » and its incorporated journals. (2 500 words and fig.)

1935 **621 .131.1 & 621 .131.**
Railway Gazette, No. 18, May 3, p. 855.
DIAMOND (E. L.). — **The horse-power of locomotives.** — Its calculation and measurement. — II. (4 00 words.)

1935 **625 .4 (.42) & 656 .211 (.42**
Railway Gazette, No. 18, May 3, p. 857.
The new Leicester Square tube station. (1 900 word and fig.)

1935 **621 .132.8 (.44**
Railway Gazette, No. 18, May 3, p. 864.
New Sentinel **railcar** in France. (600 words and fig

1935 **656 .211.5 (.42**
Railway Gazette, No. 18, May 3, p. 866.
Mechanised booking office at Liverpool Street. (1 2 words and fig.)

935 **625 .18 (.42)**
lway Gazette, No. 18, May 3, p. 868.
eorganised chair foundry at Swindon, G. W. R.
0 words and fig.)

935 **625 .2 (01 & 656 .222.1**
sel Ry. Traction, p. 750, Supplt. to Ry. Gazette, April 19.
ÄSELER. — **Fast running without derailment.**
000 words and fig.)

935 **621 .43 (.42)**
sel Ry. Traction, p. 753, Supplt. to Ry. Gazette, April 19.
le Laren **150 b.h.p. locomotive Diesel engine.** (550
rds and fig.)

935 **621 .335 (.67) & 621 .43 (.67)**
sel Ry. Traction, p. 754, Supplt. to Ry. Gazette, April 19.
ig supercharged locomotives for Equatorial Africa.
) words and fig.)

935 **621 .43 (.489)**
sel Ry. Traction, p. 755, Supplt. to Ry. Gazette, April 19.
he new Diesel Lyntog (or lightning trains) in Den-
k. (4 fig.)

935 **621 .43 (.52)**
sel Ry. Traction, p. 756, Supplt. to Ry. Gazette, April 19.
iesel traction development in Manchukuo. Semi-
amlined trains. (2 000 words and fig.)

935 **621 .43 (.42)**
sel Ry. Traction, p. 760, Supplt. to Ry. Gazette, April 19.
rotherhood 350 b.h.p. Diesel engine. (300 words
fig.)

935 **621 .43 (.42)**
el Ry. Traction, p. 761, Supplt. to Ry. Gazette, April 19.
new British **heavy-oil engine** design. — Four-stroke
with Ricardo head is now available for traction
k. (500 words and fig.)

935 **621 .43 & 621 .89**
el Ry. Traction, p. 762, Supplt. to Ry. Gazette, April 19.
ASSETT (H. N.). — **The lubrication of Diesel**
nes. (3 200 words, 1 table and fig.)

Railway Magazine. (London.)

935 **656 .222.1 (.42)**
way Magazine, May, p. 326.
LLEN (C. J.). — **British locomotive practice and**
ormance. (4 000 words, tables and fig.)

1935 **625 .232 (.42)**
Railway Magazine, May, p. 339.
SMITH (D. M.). — Familiar features of operation. — IV. — **Invalid coaches and hospital trains.** (2 000 words and fig.)

Railway Mechanical Engineer. (New York.)

1935 **621 .135.2**
Railway Mechanical Engineer, April, p. 127.
BUCKWALTER (T. V.) & PATERSON (P. C.). — **Locomotive axle failures and wheel-press fits.** (3 000 words and fig.)

1935 **621 .132.5 (.73)**
Railway Mechanical Engineer, April, p. 133.
Additional 4-8-4 heavy fast locomotives for the Lehigh Valley. (1 500 words, 3 tables and fig.)

1935 **621 .43 (.73)**
Railway Mechanical Engineer, April, p. 136.
Light-weight motor cars on the Norfolk Southern. (2 200 words and fig.)

1935 **621 .131.1**
Railway Mechanical Engineer, April, p. 138.
YOUNG (E. G.) & PEI (C. P.). — **Locomotive tractive force in relation to speed and steam supply.** (4 500 words and fig.)

1935 **669 .1**
Railway Mechanical Engineer, April, p. 150.
The bending of wrought iron plates. (4 700 words and fig.)

1935 **621 .135.5 (.73) & 621 .138.5 (.73)**
Railway Mechanical Engineer, April, p. 157.
Air compressor repairs at Pitcairn shop. (3 300 words and fig.)

1935 **621 .89 & 669**
Railway Mechanical Engineer, April, p. 164.
Babbitt metal. (600 words.)

The Locomotive. (London.)

1935 **621 .132.8 (.43)**
The Locomotive, April 15, p. 101.
Streamlined 3-cyl. 4-6-4 locomotive, German National Railways. (1 600 words and fig.)

1935 **621 .132.3 (.73)**
The Locomotive, April 15, p. 103.
High-speed locomotives, Baltimore & Ohio Railroad. (600 words and fig.)

1935 **621 .132.8 (.85)**
The Locomotive, April 15, p. 110.
Oil-fired steam railcars, Central Railway of Peru. (700 words and fig.)

1935 **625 .216 (.492)**

The Locomotive, April 15, p. 115.

The « Schaku » automatic coupler for rail cars and other rolling stock. (900 words and fig.)

1935 **621 .43 (.45)**

The Locomotive, April 15, p. 128.

Diesel engined railcar, Italian State Railways. (600 words and fig.)

1935 **621 .132.8 (.73)**

The Locomotive, April 15, p. 129.

Locomotive with condensing tender, Russian State Railways. (1 200 words and fig.)

Transit Journal. (New York.)

1935 **625 .2**

Transit Journal, April, p. 106.

WOLF (S. K.) & FOULDS (B.). — What can we do about **noise** ? (1 600 words and fig.)

1935 **625 .235 (.73)**

Transit Journal, April, p. 114.

Painting 32 cars a week. (600 words and fig.)

1935 **625 .144.1 (.73)**

Transit Journal, April, p. 116.

Welded track reduces subway noise. (1 100 words and fig.)

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1935 **621 .33 (.460)**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., marzo, p. 115; abril, p. 171.

GIBERT Y SALINAS (A.). — La **electrificación** de los ferrocarriles, problema nacional. (16 600 palabras & fig.) (Continuará.)

1935 **669 .1**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., marzo, p. 130; abril, p. 187.

VASQUEZ Y LOPEZ (J.). — **Defectos en el acero.** (9 000 palabras, 3 tablas & fig.)

1935 **625 .214**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., marzo, p. 142.

MONSALVE FLORES (M.). — **Cojinetes de bolas y rodillos.** (2 800 palabras & fig.)

Boletin de la Asociación General de transportes por vía férrea (Madrid.)

1935 **621 .43 (.460)**

Boletín de la Asoc. Gen. de transp. por vía férrea Suplemento, marzo, p. 57.

Estado actual del desarrollo de los **automotores** en los ferrocarriles de la red española. (8 000 palabras, mapa & fig.)

Caminos de hierro. (Madrid.)

1935 **656 (.460)**

Caminos de hierro, abril, p. 101.

Coordinación de transportes e intervención del Gobierno para su realización. (1 100 palabras & fig.

Ferrocarriles y Tranvias. (Madrid.)

1935 **621 .43 (.44)**

Ferrocarriles y Tranvías, abril, p. 102.

AMORRICH (A.). — **Tendencias actuales de la construcción de automotores** en Francia. (4 000 palabras & fig.)

1935 **621 .43**

Ferrocarriles y Tranvías, abril, p. 110.

EGLY (F.). — **Transmisión mecánica o hidrodinámica ?** (2 700 palabras & fig.)

Revista de Ingenieria Industrial. (Madrid.)

1935 **625 .4 (.460)**

Revista de Ingenieria industrial, abril, p. 119.

CUADRA PINZON (P. de). — Enclavamiento de la estación de Goya del **Metropolitano de Madrid.** (2 900 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1935 **656 .25**

Revista de Obras Públicas, N° 10, 15 de mayo, p. 191

WAIS (F.). — **La repetición de señales** sobre la locomotora. (3 200 palabras & fig.)

1935 **624**

Revista de Obras Públicas, N° 10, 15 de mayo, p. 19

ANGULO (A.). — Sobre **esfuerzos secundarios.** (1 10 palabras & fig.)

In Italian.

La tecnica professionale. (Firenze.)

1935 **625 .23**

La tecnica professionale, maggio, p. 134.

GIANAZZI. — **Condizionamento dell' aria negli aut treni rapidi.** (1 700 parole & fig.)

1935 621 .43 (.66)

tecnica professionale, maggio, p. 137.

Automotrici con motore a scoppio per la Colonia itrea. (2 200 parole & fig.)

L'Ingegnere. (Roma.)

1935 624 .2

ngegnere, maggio, p. 335.

BERARDINO (Vincenzo Di). — Una costruzione ai semplice per la determinazione dei punti fissi la **trave continua.** (800 parole & fig.)

---

ivista tecnica delle ferrovie italiane. (Roma.)

1935 625 .251

vista tecnica delle ferrovie ital., N° 4, 15 aprile, p. 224.

PETRORO (L.). — Soppressione dell' uso dell' accop-mento di riserva nell' aggancio dei rotabili costi-nti tremi serviti da **freno continuo automatico.** 100 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1935 62. (01 & 691

Ingenieur, N° 18, 3 Mei, p. Bt. 31.

KEVERLING BUISMAN (A. S.). — De weerstand **paalpunten in zand.** (3 000 woorden & fig.)

1935 624 .2 (.43)

Ingenieur, N° 19, 10 Mei, p. V. 31.

ROSTECK (W.). — Neuzeitliche **Mess-Verfahren und räte zum messen der Wirkungen ruhender und be-gter Verkehrslasten** auf stählerne Brücken bei der tschen Reichsbahn. (8 300 Wörter und Abb.)

1935 656 .222.5

De Ingenieur, N° 21, 24 Mei, p. A. 174.

VERSCHOOR (H. E.). — **Verhouding tusschen aantal reizigerstreinen en reizigersverkeer op de spoorwegen.** (700 woorden.)

1935 625 .12 (.492)

De Ingenieur, N° 21, 24 Mei, p. B. 93.

CUPERUS (J. L. A.). — **Onderzoek naar de bodem-gesteldheid** in den Zuidplaspolder, in verband met den spoorwegaanleg Gouda-Alphen a. d. Rijn. (6 000 woor-den & 2 tabellen.)

Spoor- en Tramwegen. (Utrecht.)

1935 621 .132.3 (.43)

Spoor- en Tramwegen, N° 10, 7 Mei, p. 227.

De snelste **stoomlocomotief** ter wereld. (800 woor-den & fig.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa.)

1935 625 .6 (.469)

Gazeta dos caminhos de ferro, N° 1137, 1. de maio, p. 191; N° 1138, 16. de maio, p. 211.

DE SOUSA (J. F.). — A crise actual de viação e os nossos **caminhos de ferro de via estreita.** (4 200 pala-vras.) (Continua.)

M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General Secretary of the Permanent Commission of the International Railway Congress Association.

SEPTEMBER (1935)

016. 385. (02]

I. — BOOKS.

In French.

935 **691 (.44)**
BÈS (G.).
e nouveau règlement du béton armé. (19 juillet 4.)
aris, Léon Eyrolles. 1 brochure, 68 pages. (Prix : francs français.)

935 **621 .4**
VILLERS (R.).
e moteur à explosions.
aris, Dunod. 1 volume, Tome Ier, 704 pages et figures. (Prix des 2 tomes non vendus séparément : 385 francs français.)

935 **621 .9**
QUET (A.).
es machines-outils servant au travail des métaux.
aris, Dunod, 92, rue Bonaparte. 1 volume (14 × 21), pages. (Prix : 19 francs français.)

935 **691 & 721 .9**
RCOTTE (E.).
onstructions en béton armé.
aris, Garnier Frères. 1 volume, 328 pages et 80 res. (Prix : 12 francs français.)

935 **385. (08(.493)**
apports présentés par le Conseil d'Administration par le Comité de surveillance de la Société Nationale chemins de fer vicinaux de Belgique. Année 1934.
ruxelles, S.N.C.V.B., 21, rue de la Science. 1 volume, 135 pages et 1 carte.

In German.

935 **656 (.44)**
MACHER (W.).
ie Neuordnung des Eisenbahnwesens und der Kraftgenwettbewerb in Frankreich.
erlin (W. 35), Deutscher Betriebswirte Verlag, G. H. 1 Band, 130 Seiten und Abbildungen. (Preis : .M.)

1935 **721 .9**
MÖRSCH (E.).
Der Eisenbetonbau.
Stuttgart, Konrad Wittwer. 1 Band, 168 Seiten und 132 Abbildungen. (Preis : 9 R.M.)

1935 **691 & 693**
MOSHAGE (J.).
Praktischer Rostschutz.
Leipzig, Jänecke, Max. 1 Band, 95 Seiten und 10 Abbildungen. (Preis : 4 R.M.)

1935 **621 .131 & 621 .137**
NIEDERSTRASSER (L.).
Leitfaden für den Dampflokomotivdienst.
Berlin, Verkehrswissenschaftliche Lehrmittelgesellschaft m.b.H. bei der Deutschen Reichsbahn. 1 Band, 416 Seiten und Abbildungen. (Preis : 7.15 R.M.)

1935 **625**
SCHAU (A.).
Eisenbahnbau.
Leipzig und Berlin, B. G. Teubner. 1 Band, 230 Seiten mit 356 Abbildungen. (Preis : 10.50 R.M.)

1935 **656 .224**
SCHNEIDER-LEYER (E.).
Post und Eisenbahn. Ihre Stellung zueinander in Vergangenheit und Gegenwart.
Würzburg, Konrad Triltsch. 1 Band, 70 Seiten. (Preis : 2 R.M.)

In English.

1935 **624. (06(.73)**
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.
Proceedings for 1934.
Chicago. Published by the Association, 319, North Waller Avenue. (6 × 9 inches.) (Price : $ 2.00.)

1935 **385. (08(.73)**
KANSAS CITY SOUTHERN RAILWAY COMPANY.
Thirty-fifth **annual report,** fiscal year ended December 31, 1934.
Kansas City, Mo. (U. S. A.). 39 pages and a map.

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress jointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 1509).

1935 385. (08(.67)

KENYA AND UGANDA RAILWAYS AND HARBOURS.

Report of the General Manager on the Administration of the Railways and Harbours for the year ended 31st December, 1934. (Part I.)

Nairobi. Printed by the Government Printer. 136 pages, tables and a map. (Price : 5 sh.)

1935 347 .763 & 656

LONG (W. Rodney).

Railway and highway transportation abroad.

Washington. United States Government Printing Office. Superintendent of Documents. 426 pages. (Price : 50 cents.)

1935 621 .43

REED (Brian).

Diesel locomotives and railcars.

London, E. C. 4. The Locomotive Publishing Company, Ltd., 3, Amen Corner, Paternoster Row. (8 1/2 × 5 1/2 inches), 200 pages, illustrated, cloth binding. (Price : 6 sh.)

1935 5 & 62

Special Jubilee Section of « Engineering ».

A series of 40 articles on science and engineering. Metallurgy. — The steel industry. — Fuel. — Locomotive railway traction. — Railway electrification. — Tunnelling. — Road passenger transport. — Harbours, docks and inland waterways. — Telegraphy and telephony. — Foundations and ground consolidation. — Structures. — Hydro-electric power. — Steam production. — Etc., etc...

London, W.C.2. 35 and 36, Bedford Street, Strand. 61 pages and fig.

1935 62. (01 & 669

SPELLER (F. N.).

Corrosion. — Causes and prevention.

New York and London. Published by McGraw-Hill Book Co. (6 × 9 inches), 694 pages, photographs, tables, diagrams. (Price : $ 7.00.)

1935 62. (01 & 621

WILSON (W. Ker).

Practical solution of torsional vibration problems.

London, W.C.2. Chapman & Hall, 11, Henrietta Street, Covent Garden. (8 3/4 × 5 1/2 inches), 438 pages. (Price : 25 sh. net.)

1935 669

THUM (Ernest E.).

The book of stainless steels.

Cleveland (Ohio), U.S.A. Published by The American Society for metals. (6 × 9 inches), 787 pages, photographs, tables, diagrams.

In Spanish.

1935 385 (.460

Conclusiones adoptadas por la Asamblea de la Asociación General de transportes por via férrea celebrada el día 16 de marzo de 1935.

Madrid, editado por dicha Asociación. 1 folleto de 26 páginas.

1935 388 (.460

LÓPEZ JAMAR (L.).

Los enlaces ferroviarios de Madrid.

Madrid, Asociación General de transportes por vía férrea, Calle del Prado, 26. 1 volumen, 78 páginas y figuras.

1935 385. (08(.460

Memoria que presenta el Consejo de Administración de la Compañía de los Ferrocarriles de M. Z. A. a la Junta General de Señores Accionistas. Ejercicio de 1934.

Madrid, Artes Gráficas, Paseo de San Vicente. 2. 1 volumen, 373 páginas.

1935 385. (06(.460

Tres años de política ferroviaria. (1° de mayo de 1932 a 30 de abril de 1935.)

Madrid, Asociación General de transportes por vía férrea. 1 volumen, 516 páginas.

In Italian.

1935 313 : 625 .611 (.45

Dati statistici per gli anni 1931-32-33. — I. — Ferrovie concesse all' industria privata.

Roma, Ministerio delle Comunicazioni. 1 volume, 274 pagine, 1 carta e figure.

[016. 385. (05]

II. — PERIODICALS.

In French.

Arts et Métiers. (Paris.)

1935 624 .2

Arts et Métiers, mai, p. 89.

DACOSTA (H.). — Quelques considérations sur l'emploi de la méthode de décomposition des charges, pour le calcul des systèmes statiquement indéterminés. (2 400 mots & fig.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

1935 5

Bull. de la Soc. d'encouragement pour l'ind. nation. juin, p. 389.

ALEXANIAN (C.). — Investigation du sous-sol par les procédés de prospection géophysique. (3 400 mots & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

934 **624 .5 (.69)**
. de la Soc. des ing. civ. de France, septembre-octobre, p. 745.
EINEKUGEL LE COCQ. — Les grands **ponts sus-dus** de Madagascar en acier au chrome-cuivre et echnique entièrement nouvelle des ponts suspendus ernes. (5 000 mots & fig.)

934 **621 .43**
. de la Soc. des ing. civ. de France, septembre-octobre, p. 794.
ERRUYS. — Deux nouveaux appareils de mesure ialement destinés à l'étude et à la mise au point **moteurs à combustion interne.** (5 400 mots & fig.)

934 **621 .131.3 (.44)**
. de la Soc. des ing. civ. de France, septembre-octobre, p. 816.
LACE (P.). — La **station d'essais** de locomotives Grands Réseaux français. (8 000 mots & fig.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

35 **385 .113 (.438)**
. de l'Union intern. des ch. de fer, avril-mai, p. 113.
s **Chemins de fer de l'Etat polonais** au cours des cices 1931 à 1934. (11 000 mots & carte.)

35 **385 .113 (.45)**
. de l'Union intern. des ch. de fer, avril-mai, p. 128.
s **Chemins de fer de l'Etat italien** pendant l'exer- 1er juillet 1933-30 juin 1934. (7 300 mots.)

35 **385 .113 (.498)**
. de l'Union intern. des ch. de fer, avril-mai, p. 145.
s **Chemins de fer roumains.** Rapports sur l'exécu- de leur programme d'amélioration (6e année). 00 mots.)

35 **385 .113 (.42)**
de l'Union intern. des ch. de fer, juin, p. 165.
IERRINGTON (C. E. R.). — Les **quatre grandes pagnies de chemins de fer de Grande-Bretagne** ant l'exercice 1934. (18 000 mots & 38 tableaux.)

35 **656 (.42)**
de l'Union intern. des ch. de fer, juin, p. 188.
s **Chemins de fer de Grande-Bretagne** et les trans- s aériens. (2 000 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

35 **385 .63**
des transp. intern. par ch. de fer, mai, p. 174; uin, p. 216.
ANNINI (A.). — La révision de la **Convention erne concernant le transport des marchandises par ins de fer.** (C. I. M.) (8 500 mots.)

1935 **313 .385 (.43)**
Bull. des transp. intern. par ch. de fer, mai, p. 203.
Les **chemins de fer allemands** pendant l'exercice 1933. (800 mots.)

1935 **313 .385 (.493)**
Bull. des transp. intern. par ch. de fer, juin, p. 243.
La **Société Nationale des chemins de fer belges** pendant l'exercice 1933. (700 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1935 **621 .335 (.494)**
Bull. techn. de la Suisse romande, N° 12, 8 juin, p. 140.
Les **automotrices légères électriques** des Chemins de fer fédéraux. (1 200 mots & fig.)

Chronique des transports. (Paris.)

1935 **656 (.44)**
Chronique des transports, N° 10, 25 mai, p. 2.
La **coordination** du rail et de la route. (1 700 mots.)

1935 **385 .113 (.44)**
Chronique des transports, N° 10, 25 mai, p. 5.
La **Compagnie des Chemins de fer de l'Est** en 1934. (4 700 mots.)

1935 **313 .385 (.44)**
Chronique des transports, N° 11, 10 juin, p. 4.
La **Compagnie du Chemin de fer du Nord** en 1934. (5 000 mots.)

1935 **621 .43 (.44)**
Chronique des transports, N° 12, 25 juin, p. 3.
Les **autorails** des grands réseaux français. (5 200 mots & cartes.) (A suivre.)

1935 **385 .113 (.44)**
Chronique des transports, N° 12, 25 juin, p. 11.
La **Compagnie du chemin de fer de Paris à Lyon et à la Méditerranée** en 1934. (5 100 mots.)

Génie civil. (Paris.)

1935 **656 .213 (.44)**
Génie civil, N° 2755, 1er juin, p. 525.
DESPUJOLS. — L'état actuel des travaux d'aménagement du port du Havre. La **gare maritime** transatlantique. (6 000 mots & fig.)

1935 **621 .33**
Génie civil, N° 2757, 22 juin, p. 611.
PARODI (H.). — Avantages de l'**électrification des chemins de fer.** (2 500 mots.)

1935 **62. (01 & 621 .332**
Génie civil, N° 2757, 22 juin, p. 612.
MERKLEN (J.) & VALLOT (E.). — Considérations sur la rupture brusque d'un pylone de **transport d'énergie.** (2 000 mots & fig.)

1935 **62. (01 & 624 .6**

Génie civil, N° 2758, 29 juin, p. 635.

DELANGHE (G.). — La détermination photo-élastique des contraintes dues aux dilatations dans un modèle de **pont en arc.** (2 200 mots & fig.)

1935 **621 .82**

Génie civil, N° 2758, 29 juin, p. 639.

Nouvel **accouplement élastique,** système R. Planche. (800 mots & fig.)

1935 **621 .4**

Génie civil, N° 2760, 6 juillet, p. 19.

Appareil de **transmission hydraulique** à vitesse variable, système Haslam et Newton. (700 mots & fig.)

1935 **669 .1**

Génie civil, N° 2760, 6 juillet, p. 21.

Le durcissement superficiel des **aciers** et des **fontes** par nitruration. (900 mots.)

1935 **62. (01(.44)**

Génie civil, N° 2761, 13 juillet, p. 29.

L'HERMITE (R.). — Les **laboratoires** du bâtiment et des travaux publics (6 100 mots & fig.)

1935 **691 & 721 .9**

Génie civil, N° 2761, 13 juillet, p. 39.

TOURNAY (Ch.). — L'emploi du **béton** vibré pour la réparation des ouvrages en béton armé. (5 300 mots & fig.)

L'Allégement dans les Transports. (Lucerne.)

1935 **621 .335**

L'Allégement dans les Transports, mai-juin, p. 59.

EDELMANN (Fr.). — **Allégement** d'automotrices monophasées. (1 300 mots & fig.)

La Science et la Vie. (Paris.)

1935 **385. (01(.66)**

La Science et la Vie, juin, p. 475.

Le **transsaharien** serait-il viable ? (1 100 mots & fig.)

La Traction électrique. (Paris.)

1935 **625 .253**

La Traction Electrique, mars-avril, p. 19.

CHRISTEN (F.). — Les robinets de mécanicien pour le **frein automatique à air comprimé.** (4 500 mots & fig.)

1935 **621 .33 (.438)**

La Traction Electrique, mars-avril, p. 25.

PODOSKI (J.). — Etude économique de l'**électrification** du trafic de banlieue du nœud ferroviaire de Varsovie. (2 700 mots.) (A suivre.)

Le Container. (Paris.)

1935 **656 .225 & 656 .26**

Le Container, mai, p. 2.

de BOYSSON (L.). — Essais d'amarrage de co**tainers.** (8 900 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.

1935 **621 .43 (.73**

Les Chemins de fer et les Tramways, juin, p. 140.

SPIESS (E.). — Le « **Comet** », train automote articulé du New-York, New-Haven and Hartford Ra road. (9 500 mots & fig.)

1935 **621 .43 (.44**

Les Chemins de fer et les Tramways, juin, p. 147.

Automotrice Diesel électrique à voie métrique Bri sonneau et Lotz. (3 200 mots & fig.)

1935 **621 .33 (.82**

Les Chemins de fer et les Tramways, juin, p. 150.

L'**électrification** du Chemin de fer Central de République Argentine. (Voie de 1 m. 676.) (2 200 mo & fig.)

1935 **625 .21**

Les Chemins de fer et les Tramways, juin, p. 152.

Bogie articulé. (1 800 mots & fig.)

1935 **621 .134**

Les Chemins de fer et les Tramways, juin, p. 154.

Le **graissage** des cylindres à vapeur et du mouv ment des locomotives. (2 700 mots & fig.)

1935 **621 .132**

Les Chemins de fer et les Tramways, juin, p. 156.

Automotrices à vapeur. (2 000 mots & fig.)

1935 **621 .134**

Les Chemins de fer et les Tramways, juin, p. 158.

Surchauffeur. (1 800 mots & fig.)

1935 **625 .144 .4 & 625 .1**

Les Chemins de fer et les Tramways, juin, p. 161.

VIÉ (G.). — Perfectionnements récents dans l'o tillage mécanique et l'organisation de **la pose et l'e tretien des voies.** (5 900 mots & fig.)

1935 **621 .132.8 (.73**

Les Chemins de fer et les Tramways, juillet, p. 17

SPIESS (E.). — **Trains à vapeur à grande vites** aux Etats-Unis « Hiawatha », « Lady Baltimore » « Lord Baltimore ». (10 800 mots & fig.) (A suivre

---

1935 **621 .133**

Les Chemins de fer et les Tramways, juillet, p. 17

Régulateur de tirage à hélices. (900 mots & fig.)

1935 **625 .2**

Les Chemins de fer et les Tramways, juillet, p. 17

Le **bogie Brill 84 E.** (400 mots & fig.)

1935 **621 .43 (.43)**
Les Chemins de fer et les Tramways, juillet, p. 180.
KEULETAN (L.). — **Automotrices** de la Reichsbahn. (Programme de construction.) (2 000 mots, 3 tableaux & fig.)

1935 **621 .43**
Les Chemins de fer et les Tramways, juillet, p. 182.
Transmission hydraulique pour locomotives Diesel. (1 800 mots & fig.)

1935 **625 .17**
Les Chemins de fer et les Tramways, juillet, p. 185.
La **voie moderne** et le rôle des équipes. (4 000 mots & fig.)

1935 **656 .213 (.44)**
Les Chemins de fer et les Tramways, juillet, p. 190.
GLATIGNY. — La nouvelle **gare maritime** du Havre. (2 000 mots & fig.)

1935 **625 .13 (.44)**
Les Chemins de fer et les Tramways, juillet, p. 192.
Le **tunnel routier** sous le Mont-Blanc. (1 500 mots & fig.)

1935 **625 .1 (.44)**
Les Chemins de fer et les Tramways, juillet, p. 194.
CHARRIN (V.). — Les **percées des Vosges.** La ligne St-Dié-Ste-Marie-aux-Mines. (1 400 mots & fig.)

L'Ingénieur-Constructeur. (Paris.)

1934 **624 .63 (.44)**
L'Ingénieur-Constructeur, mai-juin, p. 3441.
SOUILLOT (H.). — **Essais du nouveau pont** de Saint-Thibault sur la Loire. (2 000 mots & fig.)

L'Ossature métallique. (Bruxelles.)

1935 **721 .9 (.439)**
L'Ossature métallique, mai, p. 247.
ENYEDI (B.). — La construction à ossature métallique en Hongrie. **Poteaux légers en acier enrobés de béton.** (2 400 mots & fig.)

1935 **624 .32**
L'Ossature métallique, juin, p. 311.
KLÖPPEL (K.). — **Ponts-routes** de moyenne et de faible portée. (3 700 mots & fig.)

1935 **624 (.493)**
L'Ossature métallique, juin, p. 327.
DESPRETS (R.). — **Ponts-rails** à âme pleine en Belgique. (1 000 mots & fig.)

1935 **624 .32 (.73) & 624 .62 (.73)**
L'Ossature métallique, juin, p. 333.
FRANKLAND (F. H.). — Perfectionnements récents dans l'étude et la construction des **ponts en acier de petite portée aux Etats-Unis.** (2 300 mots & fig.)

1935 **624 .32 (.42) & 624 .62 (.42)**
L'Ossature métallique, juin, p. 343.
GRISENTHWAITE (T. C.). — Les **ponts en acier de faible portée.** (3 600 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1935 **625 .172 (.44)**
Revue générale des chemins de fer, juin, p. 555.
BLONDEL. — Les **équipes à longs parcours** du réseau d'Orléans. (4 200 mots & fig.)

1935 **385 .587 (.44) & 621 .138.5 (.44)**
Revue générale des chemins de fer, juin, p. 563.
KOENIGER. — Réparation des éléments **surchauffeurs** aux Chemins de fer d'Alsace et de Lorraine à Bischheim. (2 000 mots & fig.)

1935 **691 (.44) & 721 .9 (.44)**
Revue générale des chemins de fer, juin, p. 570.
CASSÉ. — Note sur les instructions, en date du 19 juillet 1934, relatives à l'emploi du **béton armé** dans les ouvrages dépendant du Ministère des Travaux Publics. (3 500 mots.)

1935 **621 .33 (.44)**
Revue générale des chemins de fer, juin, p. 585.
L'électrification de Paris-Le Mans par les Chemins de fer de l'Etat. (700 mots & carte.)

1935 **625 .234 (.44)**
Revue générale des chemins de fer, juillet, p. 3.
NASSE. — Système de chauffage des voitures par **conditionnement de l'air** sur le réseau de l'Etat. (5 000 mots & fig.)

1935 **385. 517.1 (.44)**
Revue générale des chemins de fer, juillet, p. 12.
BERNARD (A.). — Etude de la mortalité des **retraités** des Grands Réseaux français. (7 000 mots, 2 tableaux & graphiques.)

1935 **385 .113 (.48)**
Revue générale des chemins de fer, juillet, p. 29.
Les **réseaux scandinaves.** (7 700 mots & fig.)

1935 **656 .27 (.43)**
Revue générale des chemins de fer, juillet, p. 42.
Le **transport combiné** des voyageurs et des marchandises sur les lignes secondaires. (1 500 mots & fig.)

1935 **621 .132.3 (.43)**
Revue générale des chemins de fer, juillet, p. 48.
La **locomotive à vapeur** à grande vitesse 2-3-2 des Chemins de fer du Reich. (1 000 mots & fig.)

Revue politique et parlementaire. (Paris.)

1935 **385**
Revue politique et parlementaire, 10 juin, p. 543.
DIVISIA (F.). — Revue des questions de transport. **Les chemins de fer.** (6 700 mots & fig.)

Revue universelle des Mines. (Liége.)

1935 **621 .2**

Revue universelle des mines, juin, p. 268.

FOULON (E.). — Théorie des lignes d'influence des **poutres droites** en treillis à croix de St-André. (5 800 mots & fig.)

1935 **691**

Revue universelle des mines, juillet, p. 321.

DANTINNE (R.) & JACQUEMIN (R.). — Le dosage des **bétons.** (6 200 mots, 5 tableaux & fig.)

1935 **385. (09.3(.493)**

Revue universelle des mines, juillet, p. 309.

LAMALLE (U.). — Le **centenaire des chemins de fer belges.** (2 700 mots & fig.) (A suivre.)

1935 **669 .1**

Revue universelle des mines, juillet, p. 316.

THYSSEN (H.) & BONHOMME (W.). — Le soufre dans les **aciers** et les **fontes.** (6 400 mots & fig.)

1935 **691 & 721 .9**

Revue universelle des mines, juillet, p. 326.

TOURNAY (Ch.). — L'emploi du **béton** vibré pour la réparation des ouvrages en béton armé. (5 400 mots & fig.)

In German.

Die Lokomotive. (Wien.)

1935 **621 .132.3 (.437) & 621 .132.6 (.437)**

Die Lokomotive, Heft 6, Juni, S. 97.

2D2-Schnellzugstenderlokomotive Reihe 4640 der C. S. D., entworfen und gebaut von der Ceskomoravska-Kolben-Danek A. G. (2 600 Wörter und Abb.)

Elektrische Bahnen. (Berlin.)

1935 **621 .335 (.43)**

Elektrische Bahnen, Mai, S. 123.

REICHEL (W.). — **Elektrische 1 Co 1-Schnellzuglokomotive** mit Tatzenmotoren Gattung E05 der Deutschen Reichsbahn. (5 000 Wörter und Abb.) (Schluss folgt.)

1935 **625 .255**

Elektrische Bahnen, Mai, S. 140.

BUCHHOLD (Th.). — Die **elektrische Gleichstrom-Widerstandsbremse** bei Wechselstrom-Fahrzeuger. (2 600 Wörter und Abb.)

1935 **621 .335 (.43)**

Elektrische Bahnen, Juni, S. 157.

REICHEL (W.) & TETZLAFF (H.). — **Elektrische 1 Co 1-Schnellzuglokomotive** mit Tatzenmotoren Gattung E05 der Deutschen Reichsbahn (3 500 Wörter und Abb.)

Glasers Annalen. (Berlin.)

1935 **621 .139 (.43) & 625 .27 (.43)**

Glasers Annalen, Heft 10, 15. Mai, S. 77.

HAAS. — Die Altstoffe in der **Metallwirtschaft** der Reichsbahn. (6 400 Wörter und Abb.) (Schluss folgt.)

1935 **625 .144.2**

Glasers Annalen, Heft 11, 1. Juni, S. 92; Heft 12, 15. Juni, S. 99.

HEUMANN. — **Leitschienenführung** von Gleisfahrzeugen in Gleisbögen. (9 300 Wörter und Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1935 **625 .143.4**

Organ für die Fortschritte des Eisenbahnwes., Heft 12, 15. Juni, S. 207.

LAUBOECK. — Die **federnde Stossbrücke.** (1 300 Wörter und Abb.)

1935 **625 .143.5**

Organ für die Fortschritte des Eisenbahnwes., Heft 12, 15. Juni, S. 209.

LAUBOECK. — Der **Spannageloberbau.** (900 Wörter und Abb.)

1935 **621 .43**

Organ für die Fortschritte des Eisenbahnwes., Heft 12, 15. Juni, S. 210.

MARSCHALL (A.). — **Zugförderung durch Dieselmotoren.** (4 200 Wörter, 7 Tabellen und Abb.)

1935 **621 .132.1 (437)**

Organ für die Fortschritte des Eisenbahnwes., Heft 12, 15. Juni, S. 216.

WOHLLEBE (E.). — **Neue Lokomotiven** der Tschechoslowakischen Staatsbahnen. (3 000 Wörter und Abb.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1935 **62. (01 & 621 .92)**

Zeitschrift des Ver. deutsch. Ing., Nr. 22, 1. Juni, S. 690.

THUM (A.). — **Schweissgerechte Maschinengestaltung.** (2 500 Wörter und Abb.)

1935 **621 .392**

Zeitschrift des Ver. deutsch. Ing., Nr. 22, 1. Juni, S. 699.

KALISCH (E.). — Arbeitsuntersuchungen beim **Schweisen.** (1 900 Wörter und Abb.)

1935 **621 .135.3 & 625 .213**

Zeitschrift des Ver. deutsch. Ing., Nr. 23, 8. Juni, S. 727.

STARK (H.). — Die Ermittlung der Formänderungen und des Spannungszustandes von **Pufferfedern** (3 500 Wörter und Abb.)

1935 62. (01 & 621 .392)
eitschrift des Ver. deutsch. Ing., Nr. 23, 8. Juni, S. 735.

Festigkeit und Spannungszustand bei **geschweissten** erbindungen. (700 Wörter und Abb.)

1935 621 & 669 .1
eitschrift des Ver. deutsch. Ing., Nr. 24, 15. Juni, S. 743.

VOSS (H.). — örtliche Oberflächenhärtung von **Kur**elwellen. (3 400 Wörter und Abb.)

1935 691 & 669
eitschrift des Ver. deutsch. Ing., Nr. 24, 15. Juni, S. 753.

BAUERMEISTER (H.) & KERSTEN (R.). — **Kor**sionsversuche mit Schrauben in Leichtmetall-Bauteien. (1 700 Wörter und Abb.)

1935 62. (01 & 621 .392)
eitschrift des Ver. deutsch. Ing., Nr. 26, 29. Juni, S. 800.

RIETSCH (E.). — Stand der **Widerstandsschweiss**echnik. (4 200 Wörter und Abb.)

1935 621 .392
eitschrift des Ver. deutsch. Ing., Nr. 26, 29. Juni, S. 805.

OTTO (J.). — **Ortsbewegliche Widerstandsschweiss**nrichtung grosser Leistung. (2 000 Wörter und Abb.)

1935 621 .43
eitschrift des Ver. deutsch. Ing., Nr. 26, 29. Juni, S. 810.

GRANTZ (S.). — Eignung der **Diesellokomotive** mit mittelbarem Antrieb für Schnellfahrten. (600 Wörr und Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

1935 656 .254 (.43)
eitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 8, 10. Juni, S. 91.

LÜTGERT. — Die **Selbsttätigen Warnanlagen an** egübergängen bei der Deutschen Reichsbahn. (2 400 örter, 2 Tafeln und Abb.)

1935 625 .162 (.43)
eitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 9, 10. Juli, S. 107.

BUDDENBERG. — Die **Reichsbahnschranke.** (2 200 örter und Abb.) (Fortsetzung folgt.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1935 656 .212
eitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 22, 30. Mai, S. 437.

ADAM (A.). — **Verkehrsbedienung** früher und jetzt. 3 300 Wörter und Abb.)

1935 385. (09.3(.493)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 22, 30. Mai, S. 442.

WERNEKKE. — **Hundert Jahre belgische Eisenbahnen.** (1 900 Wörter.)

1935 385 .113 (.43)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 23, 6. Juni, S. 456.

Der **Geschäftsbericht der Deutschen Reichsbahn-Gesellschaft** über das 10. Geschäftsjahr 1934. (3 400 Wörter.)

1935 656 (.485)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 23, 6. Juni, S. 462.

Vorschläge zu einer **Verkehrsregelung zwischen Eisenbahn und Kraftwagen** in Schweden. (2 300 Wörter.)

1935 385. (07.4(.43)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 24, 13. Juni, S. 480.

Das **Verkehrs- und Baumuseum in Berlin.** (1 800 Wörter und Abb.)

1935 385 .62 & 385 .63
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 25, 20. Juni, S. 401.

SCHMID (E.). — Die Beurteilung der neuen **internationalen Übereinkommen.** (900 Wörter.)

1935 385. (074(.43)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 29, 18. Juli, S. 601.

ALDINGER (R.). — Das **Verkehrsmuseum Nürnberg** im Rahmen der Jubiläumsfeier. (2 800 Wörter und Abb.)

1935 385. (06.4(.43)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 29, 18. Juli, S. 605.

WEISS & KAESS. — **Reichsbahnausstellung Nürnberg 1935 « 100 Jahre Deutsche Eisenbahn ».** (2 300 Wörter und Abb.)

1935 385. (09.3(.43)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 27-28, 6. Juli, S. 534.

HENUCH (H.). — Die erste deutsche Eisenbahn (**Ludwigsbahn Nürnberg-Fürth**). (9 300 Wörter und Abb).

1935 385. (09.3 (.43)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 27-28, 6. Juli, S. 551.

REMY. — **Hundert Jahre deutscher Schienenweg.** Gegebenheiten und Folgerungen für die deutsche Verkehrswirtschaft. (12 300 Wörter.)

1935 621 .13 (09(.43)
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 27-28, 6. Juli, S. 590.

WITTE (Fr.). — **Lokomotiventwicklung** bei den deutschen Eisenbahnen. (6 900 Wörter und Abb.)

In English.

Engineer. (London.)

1935 **621 .392, 665 .882 & 669 .1**

Engineer, No. 4140, May 17, p. 506; No. 4141, May 24, p. 532; No. 4142, May 31, p. 559.

Symposium on the **welding of iron and steel.** (18 600 words.) (To be continued.)

1935 **62. (064 (.42)**

Engineer, No. 4140, May, 17, p. 510; No. 4141, May 24, p. 542; No. 4142, May 31, p. 570.

The British Industries Fair at Birmingham. (6 200 words and fig.) (To be continued.)

1935 **621 .9**

Engineer, No. 4140, May 17, p. 521.

Railway **Universal machine tool.** (400 words and fig.)

1935 **533**

Engineer, No. 4141, May 24, p. 534.

The twenty-four-foot **wind tunnel** at Farnborough. (3 600 words and fig.)

1935 **621 .43**

Engineer, No. 4141, May 24, p. 545.

A new axial (« woble plate » petrol traction) engine. (2 300 words and fig.)

Engineering. (London.)

1935 **624 .8 (.43)**

Engineering, No. 3617, May 10, p. 481.

Vertical-lift bridge over the river Elbe at Magdeburg. (3 800 words and fig.)

1935 **621 .2 & 621 .43**

Engineering, No. 3617, May 10, p. 489.

HAHN (W.). — **Voith turbo-transmissions.** — Paper read before the Institution of Mechanical Engineers on Friday, May 3, 1935. — Abridged. (2 200 words and fig.)

1935 **621 .2 & 621 .43**

Engineering, No. 3617, May 10, p. 501.

Progress in design and application of the **Lysholm-Smith torque converter,** with special reference to the development in England, by Dr. H. F. HAWORTH and A. LYSHOLM. — Voith turbo transmissions, by Dr.-Ing. W. HAHN. — Discussion at the meeting held on 3 May 1935 by the Institution of Mechanical Engineers. (4 000 words.)

1935 **62 (064(.42**

Engineering, No. 3618, May 17, p. 507; No. 3619, May 24, p. 537; No. 3620, May 31, p. 562.

British Industries Fair at Birmingham. (35 000 words and fig.) (To be continued.)

1935 **669 .1 (06(.42)**

Engineering, No. 3618, May 17, p. 524; No. 3619, May 24, p. 554.

The Iron and Steel Institute. — **Corrosion of iron and steel. — Spring steels.** (6 200 words.)

1935 **621 .93**

Engineering, No. 3618, May 17, p. 527.

Locomotive-rod boring and trepanning machine. (500 words and fig.)

1935 **621 .392, 665 .882 & 669 .1**

Engineering, No. 3618, May 17, p. 529; No. 3619, May 24, p. 558.

Welding in the engineering industries. — Brief summary of papers presented in Group 1, Subgroup (a) of the Symposium on the welding of iron and steel held in London on May 2 and 3, and organised by the Iron and Steel Institute in co-operation with other technical societies. (3 000 words.)

1935 **669 .1**

Engineering, No. 3618, May 17, p. 530.

ANDREW (J. H.) & RICHARDSON (G. T.). — An investigation of **spring steels.** (3 100 words. 3 tables and fig.)

1935 **621 .392, 665 .882 & 669 .1**

Engineering, No. 3619, May 24, p. 550; No. 3620, May 31, p. 577.

The welding of iron and steel. — Discussion on the Symposium were held on May 2, 1935, at the Institution of Civil Engineers, London. (8 900 words.)

1935 **621 .15**

Engineering, No. 3620, May 31, p. 562.

GILLFORD (F. H.). — **Early traction engines.** (1 000 words.)

1935 **38 & 656**

Engineering, No. 3620, May 31, p. 579.

Conference on **transport problems.** (2 600 words.)

Engineering News-Record. (New York.)

1935 **721 .4 & 721 .9**

Engineering News-Record, No. 19, May 9, p. 676.

BEANFIELD (R. McC.). — **Unique design and construction of steel ribbed domes.** (2 000 words and fig.)

1935 **62. (01 & 69)**

Engineering News-Record, No. 20, May 16, p. 696.

CARLSON (R. W.). — **Five years' improvement of the elastic-wire strain meter.** (1 400 words and fig.)

1935 **624 .2**

Engineering News-Record, No. 20, May 16, p. 697.

Austrian fatigue tests of reinforced concrete beams. (900 words.)

1935 **691 & 693**

Engineering News-Record, No. 20, May 16, p. 698.

High speed in concreting at Norris Dam. (2 000 words and fig.)

1935 **625 .111 (.73)**
ngineering News-Record, No. 21, May 23, p. 749.
STEVENS (J. F.). — **Railway reconnaissance** over
ie Cascade Range. (2 600 words and fig.)

1935 **62 (.∞)**
ngineering News-Record, No. 22, May 30, p. 770.
Engineering in foreign countries. (2 200 words and
g.)

1935 **385 (072(.73 & 62 (01(.73)**
ngineering News-Record, No. 23, June 6, p. 798.
Research notes on **current investigations** at the Uni-
ersity of Illinois. (6 000 words and fig.)

1935 **385. (091(.51)**
ngineering News-Record. No. 23, June 6, p. 803.
Important **railway extensions** built **in China.** (800
ords and fig.)

1935 **624 .1 (.489)**
ngineering News-Record, No. 24, June 13, p. 841.
ENGELUND (A.). — **Danes introduce new caisson**
ractice at Little Belt Bridge (Denmark). (3 200
ords and fig.)

1935 **385 (09(.73)**
ngineering News-Record, No. 24, June 13, p. 850.
STEVENS (J. F.). — **An engineer's recollections.** —
he Great Northern and Fas. J. HILL. (4 000 words
nd fig.)

Great Western Railway Magazine. (London.)

1935 **625 .143 (.42)**
reat Western Railway, July, p. 371.
BOWLER (F. T.). — Great Western Railway **per-**
anent way practice. — No. IX. — **The design and**
anufacture of track components. (1 200 words and
g.)

Journal, Institution of Engineers, Australia. (Sydney, N. S. W.)

1935 **62 (01 & 654**
ournal, Institution of Engineers, Australia, April,
p. 113.
GRIFFITHS (C. J.). — Some factors affecting the
orrosion of **telephone cable sheaths.** (9 800 words
nd fig.)

Journal, Institute of Transport. (London.)

1935 **347 .763 (.42) & 656 .1 (.42)**
ournal, Institute of Transport, June, p. 300.
NICHOLL (J. S.). — The **road and rail Traffic Act,**
933, and its influence on the future of **goods trans-**
ort by road. (15 500 words.)

1935 **38 & 656**
ournal, Institute of Transport, June, p. 317.
BELL (R.). — **Transport developments** in 1934.
3 400 words.)

Mechanical Engineering. (New York.)

1935 **621 .8**
Mechanical Engineering, May, p. 287.
TATNALL (Robert R.). — **The pivoted-motor drive.**
(4 700 words and fig.)

1935 **621 .116 & 669 .1**
Mechanical Engineering, May, p. 294.
PARTRIDGE (E. P.) & SCHROEDER (W. C.). —
Boiler-steel embrittlement. (3 000 words.)

1935 **621 .116 & 66**
Mechanical Engineering, May, p. 305.
JACOBSEN (S. C.) & CARTER (G. W.). — **Solid**
smokeless fuel. (3 300 words, 3 tables and fig.)

1935 **62. (01, 669 & 698**
Mechanical Engineering, June, p. 355.
SPELLER (F. N.). — **Influence of protective layers**
on the life of metals. (8 000 words and fig.)

1935 **532**
Mechanical Engineering, June, p. 369.
ALLEN (Ch. M.) & HOOPER (L. J.). — **Venturi**
and Weir measurements. (3 000 words and fig.)

Modern Transport. (London.)

1935 **656 .222.1 & 656 .222.4**
Modern Transport, No. 836, March 23, p. 3.
PRESCOTT (C. W.). — **Speed and track capacity.** —
Effect of modern **signalling.** (1 500 words and fig.)

1935 **625 .143.1**
Modern Transport, No. 836, March 23, p. 5.
Advantages of **heavy rails.** (1 500 words and tables.)

1935 **625 .232 (.73)**
Modern Transport, No. 836, March 23, p. 7.
Light weight streamlined passenger coaches for Ame-
rican service. (2 300 words and fig.)

1935 **656 .25 (0**
Modern Transport, No. 836, March 23, p. 8.
Nomenclature of **railway signals.** — **A suggested**
code. (1 000 words.)

1935 **65**
Modern Transport, No. 837, March 30, p. 3.
HICHENS (W. L.). — **Competition in transport and**
industry. — **Dangers of « planning ».** (2 000 words.)

1935 **669 .1**
Modern Transport, No. 837, March 30, p. 4.
Development in **stainless steel.** (1 200 words.)

1935 **656 .1 (.42) & 656 .223.1 (.42)**
Modern Transport, No. 837, March 30, p. 5.
JACKSON (W. N.). — **Pooling of long-distance**
coach services. (3 400 words.)

1935 **621 .43 (.73)**
Modern Transport, No. 837, March 30, p. 9.
Another American **streamlined train.** The « Flying Yankee ». (700 words and fig.)

1935 **656 (.44)**
Modern Transport, No. 837, March 30, p. 9.
Co-ordination in France. — Views of Mr. Raoul DAUTRY. (700 words.)

1935 **388 (.42)**
Modern Transport, No. 838, April 6, p. 3.
Transport problem in North-East London. (4 000 words and a map.)

1935 **621 .33 (.42)**
Modern Transport, No. 843, May 11, p. 3.
Railway electrification in Belgium. — Completion of Brussels-Antwerp line. (1 600 words and fig.)

1935 **38 (.8) & 656. (.8)**
Modern Transport, No. 843, May 11, p. 4.
Continued recovery in Latin America. — **Road and air transport.** (2 400 words.)

1935 **385 (064(.42) & 621 .132.3 (.42)**
Modern Transport, No. 843, May 11, p. 5.
Progress in **locomotive and carriage design.** — The « Silver Jubilee » **Exhibition at Euston.** (2 000 words and fig.)

1935 **621 .2 & 621 .43**
Modern Transport, No. 843, May 11, p. 6.
Development of the torque converter. — **Lysholm Smith and Voith systems.** (1 300 words and fig.)

1935 **347 .763 (.41) & 656. (.41)**
Modern Transport, No. 843, May 11, p. 7.
Transport in Northern Ireland. — **Road-rail co-operation under new bill.** (2 000 words.)

1935 **656 .253 (.42) & 656 .258 (.42)**
Modern Transport, No. 844, May 18, p. 3.
Re-signalling of Fenchurch Street Station. (2 800 words and fig.)

1935 **656 .1 (.42)**
Modern Transport, No. 844, May 18, p. 5.
EDWARDS (F.). — **Traffic-actuated road signals.** (1 600 words and fig.)

1935 **625 .1 (.42) & 656 .211 (.42)**
Modern Transport, No. 844, May 18, p. 11.
New works on the Mersey Railway. — **Provision for six-car trains** at Liverpool Terminus. (1 100 words and fig.)

1935 **385. (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. III.
SCHÖPFER (A.). — **The Austrian Federal Railways. — Their organisation and equipment.** (1 700 words and fig.)

1935 **625 .24 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. IV.
Freight rolling stock in Austria. (1 000 words and fig.)

1935 **621 .33 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. V.
STRAUSS (F.). — **Electrification** of Austrian Federal Railways. — **Rapid extension of system in mountainous districts.** (3 200 words and fig.)

1935 **621 .33 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. VII.
KAAN (E.). — **Electrification** of the Tauern Railway. (1 600 words and fig.)

1935 **388 (.436) & 625 .62 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. VIII.
Vienna Stadtbahn converted into a tramway. (4 900 words and fig.)

1935 **621 .43 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. XIV.
Railcars in Austria. — **Diesel electric and petrol units.** (1 200 words and fig.)

1935 **621 .138.5 (.436) & 625 .16 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. XV.
STRAUSS (F.). — **Workshop organisation** on Austrian Railways. — The **new plant** at Linz. (1 800 words and fig.)

1935 **625 .104 (.436) & 625 .3 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. XVII.
The Arlberg line. — **Protection against avalanches.** (800 words and fig.)

1935 **621 .133.1 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. XVIII.
Fuel consumption on the Austrian Railways. — The **coal bonus system.** (1 200 words.)

1935 **621 .138.1 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. XIX.
Locomotive running on the Austrian Railways. — The Linz and Innsbruck **sheds.** (2 300 words and fig.)

1935 **625 .12 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. XXI.
STRAUSS (F.). — New ideas in **permanent way construction.** (2 700 words and fig.)

1935 **621 .132.6 (.436)**
Modern Transport, No. 844, May. 18, Austrian Congress Section, p. XXIII.
Light locomotives for passenger services. — Economical units for **suburban work.** (1 600 words and fig.)

1935 **656 .1 (06(.41)**
Modern Transport, No. 845, May 25, p. 1.
Scottish operators discuss **road and rail competition.** — Alleged railway bias in recent legislation. (4 300 words.)

1935 **656. (06(.42)**
Modern Transport, No. 845, May 25, p. 8.
Problems of transport. — **Questions affecting services by road, rail, sea and air.** (3 200 words.)

1935 **656 .253 (.42)**
Modern Transport, No. 846, June 1, p. 3.
Bristol (Temple Meads station) **new signalling installation.** (1 200 words and fig.)

1935 **621 .43 & 621 .8**
Modern Transport, No. 846, June 1, p. 5.
Turbo transmission for rail vehicles. — Principles of the **Voith system.** (1 400 words and fig.)

1935 **656 .211 (.42)**
Modern Transport, No. 847, June 8, p. 3.
New station on L. M. S. Southend line between Dagenham and Hornchurch. (1 900 words and fig.)

1935 **621 .43**
Modern Transport, No. 847, June 8, p. 5.
Can railway services be improved ? — **Diesel units for fast traffic.** (2 300 words.)

Proceedings, Association of American Railroads. (Signal Section). (New York.)

1935 **656 .25 (06(.73)**
Proceed., Assoⁿ of Amer. Railroads, Signal Section, p. 357.
Minutes forty-first annual meeting, Chicago, Ill., March 11 and 12, 1935.

Proceedings, Institution of Railway Signal Engineers. (Reading).

1934-35 **656 .25 (06(.42) & 656 .253**
Proceed., Institut. of Ry. Signal Engineers, Oct.-Jan., p. 219.
General Meeting of the Institution held at the Institution of Electrical Engineers, Oct. 10th, 1934. — Discussion on the **« Distant Signal Problem ».** (4 000 words.)

1935 **656 .212.5 (.42) & 656 .259 (.42)**
Proceed., Institut. of Ry. Signal Engineers, Oct.-Jan., p. 237.
Electrically controlled gravity marshalling yards. With special reference to Whitemoor, L. N. E. R.), by F. S. JACKSON. — Paper and discussion. (15 000 words and fig.)

1935 **656 .256**
Proceed., Institut. of Ry. Signal Engineers, Oct.-Jan., p. 270.
Some developments in intermediate **block signalling,** by S. W. SPENDLOVE. — Paper and discussion. (25 000 words and fig.)

1935 **621 .31 & 656 .25**
Proceed., Institut. of Ry. Signal Engineers, Oct.-Jan., p. 321.
PETER (L. H.). — **Some applications of rectifiers to railway signalling.** (11 400 words and fig.)

Railway Age. (New York.)

1935 **621 .43 (.73)**
Railway Age, No. 17, April 27, p. 632.
The New Haven's « Comet ». (6 000 words, 1 table and fig.)

1935 **625 .111 (.73) & 625 .162 (.73)**
Railway Age, No. 17, April 27, p. 643.
FORD (R. H.). — **The highway grade crossing.** A national problem. (2 600 words.)

1935 **625 .243 (.73)**
Railway Age, No. 17, April 27, p. 646.
New **freight cars** developed by the Baltimore and Ohio. (1 200 words and fig.)

1935 **656 .223.2 (.73)**
Railway Age, No. 17, April 27, p. 649.
KIRKLAND (W. B.). — **Car service rules are not static.** (2 600 words.)

1935 **656 .261 (.73)**
Railway Age, No. 17, April 27, p. 653.
Experience justifies Pennsylvania's faith in **storedoor service.** (1 200 words and fig.)

1935 **625 .23 (0 (.73) & 625 .232 (.73)**
Railway Age, No. 18, May 4, p. 671.
Baltimore and Ohio **light-weight passenger trains.** (5 500 words, tables and fig.)

1935 **621 .132.3 (.73)**
Railway Age, No. 18, May 4, p. 681.
Baltimore and Ohio builds **steam power for high speed.** (3 000 words and fig.)

1935 **625 .13 (.73) & 656 .211 (.73)**
Railway Age, No. 18, May 4, p. 686.
Pennsylvania completes many improvements at Baltimore. (4 200 words and fig.)

1935 **625 .17 (.73) & 656 .284 (.73)**
Railway Age, No. 18, May 4, p. 693.
Railways combat « black blizzard ». (3 300 words and fig.)

1935 **621 .132.3 (.73)**
Railway Age, No. 19, May 11, p. 719.
Milwaukee buys **streamlined steam locomotives for fast schedules.** (3 300 words and fig.)

1935 **625 .232 (.73)**
Railway Age, No. 19. May 11, p. 726.
Hiawatha cars as spectacular as the locomotives. (3 300 words, tables and fig.)

1935 **621 .162 (.73) & 656 .259 (.73)**
Railway Age, No. 19, May 11, p. 739.
Two views on **grade crossing problem.** (3 700 words and fig.)

1935 **621 .139 (.73), 625 .18 (.73) & 625 .27 (.73)**
Railway Age, No. 20, May 18, p. 766.
MOREHEAD (W. S.). — Illinois Central changes **stores practices.** — Purchasing facilitated and handling costs reduced by improving methods of ordering and distributing material. (2 000 words and fig.)

1935 **625 .244**
Railway Age, No. 20, May 18, p. 769.
LINDSAY (H. B.). — Improved **refrigerator car** design long overdue. (3 200 words.)

1935 **625 .253 (.73)**
Railway Age, No. 20, May 18, p. 772.
Track capacity and safety increased by new signaling on the Erie. (1 200 words and fig.)

1935 **621 .13 (01**
Railway Age, No. 21, May 25, p. 800.
BINKERD (R. S.). — **What about the steam locomotive ?** (6 000 words.)

1935 **625 .142.2 (.73) & 691 (.73)**
Railway Age, No. 21, May 25, p. 805.
What of the **crosstie ?** (Problems of **production, seasoning and grading** studied at meeting of Railway Tie Association. (6 800 words and fig.)

1935 **388 59 (.73) & 656 .286 (.73)**
Railway Age, No. 21, May 25, p. 819.
Cost of employee accidents, 1932. (3 000 words and 1 table.)

1935 **656 .211.4 (.73)**
Railway Age, No. 22, June 1, p. 844.
Pennsylvania and Reading complete unification of South Jersey facilities. (3 600 words and fig.)

1935 **621 .132.5 (.73)**
Railway Age, No. 22, June 1, p. 849.
Single-expansion, articulated locomotives of 2-6-6-4 type built by Baldwin for heavy fast-freight service, Seabord Air line. (1 100 words and fig.)

1935 **385**
Railway Age, No. 22, June 1, p. 859.
PELLEY (J. J.). — **Railroad problems** not complex. (1 900 words.)

1935 **621 .43 (.73)**
Railway Age, No. 23, June 8, p. 875.
Union Pacific **streamliner** « City of Portland » enters service. (2 600 words and fig.)

1935 **656 .211.4 (.73) & 725 .31 (.73)**
Railway Age, No. 23, June 8, p. 880.
Modern **passenger terminal** built at Atlantic City, N. J. (3 800 words and fig.)

1935 **621 .43 (.73)**
Railway Age, No. 24, June 15, p. 910.
Gulf, Mobile and Northern buys **motor trains of welded construction.** (9 300 words and fig.)

1935 **625 .122 (.73)**
Railway Age, No. 24, June 15, p. 925.
Employs drastic **measures to cure slide condition.** (2 300 words and fig.)

1935 **625 .245 (.73) & 625 .246 (.73)**
Railway Age, No. 24, June 15, p. 954.
Light-weight hopper car for Rustless Iron Corporation of America. (1 300 words and fig.)

1935 **625 .243 (.73) & 625 .246 (.73)**
Railway Age, No. 25, June 22, p. 957.
Mt. Vernon builds **light box car.** (600 words, 2 tables and fig.)

1935 **625 .243 (.73) & 625 .246 (.73)**
Railway Age, No. 25, June 22, p. 959.
Pullman produces **light box car** without added cost. — Five tons of dead weight saved in 50-ton car. (2 600 words, tables and fig.)

1935 **625 .111 (.73) & 625 .162 (.73)**
Railway Age, No. 25, June 22, p. 969.
$ 200 000 000 **for grade separation.** (15 000 words and fig.)

Railway Engineering and Maintenance. (New York.)

1935 **625 .14 (.73) & 656 .222.1 (.73)**
Railway Engineering and Maintenance, June. p. 330
Putting up track for the World's fastest steam trains. (4 800 words and fig.)

1935 **62. (01 & 625 .13**
Railway Engineering and Maintenance, June, p. 341
Checking bridge corrosion. (700 words and fig.)

Railway Gazette. (London.)

1935 **656 .25(0**
Railway Gazette, No. 19, May 10, p. 923.
Economic aspects of **railway signalling.** (3 60 words and tables.)

1935 **625 .13 & 625 .1**
Railway Gazette, No. 19, May 10, p. 927.
HULL (H. A.). — **Railway maintenance problems V. — Superstructures.** (1 600 words and fig.)

1935 621 .132.3 (.42)
ailway Gazette, No. 19, May 10, p. 930.
The L. M. S. Ry. Silver Jubilee locomotive. (400 ords and fig.)

1935 656 .211 (.42)
ailway Gazette, No. 19, May 10, p. 931.
Fenchurch Street **Station remodelling,** L. N. E. Ry. 1 900 words and fig.)

1935 656 (.41)
ailway Gazette, No. 19, May 10, p. 937.
To co-ordinate transport in Northern Ireland. (1 700 ords and fig.)

1935 656 .224 (.940)
ailway Gazette, No. 20, May 17, p. 970.
ARTHURTON (A. W.). — **Impressions of overseas ransport.** — XVIII. — By a general speeding-up of ervices and the use of special colour schemes to fami- arise the public with the principal expresses, the ew South Wales Government Railways are **securing etter passenger patronage.** (1 000 words.)

1935 385. (.82)
ailway Gazette. No. 20. May 17. p. 971.
Argentine Government Committee report of investi- ation. (1 800 words.)

1935 621 .132.3 (.44) & 621 .132.8 (.44)
ailway Gazette. No. 20. May 17, p. 973.
Bugatti super-pressure locomotive for the P. L. M. 400 words and fig.)

1935 656 .253 (.42)
ailway Gazette, No. 20, May 17, p. 974.
Resignalling Fenchurch Street **Station, L. N. E. Ry.** 1 900 words and fig.)

1935 621 .132.3 (.518) & 625 .232 (.518)
ailway Gazette, No. 20. May 17. p. 980.
The Asia Express. — **High-speed streamlined steam rain** connecting Dairen and Hsinking, South Manchu- ia Railway. (800 words and fig.)

1935 656 .253 (.436)
ailway Gazette, No. 20, May 17, p. 983.
Signalling improvements on the Austrian Federal ailways. (1 500 words and fig.)

1935 385. (01(.945)
ailway Gazette, No. 21, May 24, p. 1024.
ARTHURTON (A. W.). — **Impressions of overseas ransport.** — XIX. — The **policy of the Victorian overnment Railways** is to develop the country and reate wealth, rather than to make profits. (1 200 ords.)

1935 656 .26 (.42)
ailway Gazette, No. 21, May 24, p. 1026.
British railway ancillary business. — 1934 results eviewed. (1 900 words and 2 tables.)

1935 624 .32 (.489)
Railway Gazette, No. 21, May 24, p. 1028.
Little Belt bridge. (1 600 words and fig.)

1935 621 .138.5 (.42) & 621 .9 (.42)
Railway Gazette, No. 21, May 24, p. 1033.
New **machine tool installations** at Crewe Works, L. M. S. Ry. (2 600 words and fig.)

1935 621 .43 (.73)
Railway Gazette, No. 21, May 24, p. 1037.
Atlantic type **streamlined locomotives,** Chicago, Milwaukee, St. Paul and Pacific Railroad. (400 words and fig.)

1935 656 .253 (.42)
Railway Gazette, No. 22, May 31, p. 1065.
Re-signalling of Temple Meads station, Bristol, G. W. R. (1 000 words and fig.)

1935 62. (01 (.54) & 625 .13 (.54)
Railway Gazette, No. 22, May 31, p. 1069.
Recent practice in **testing of bridges** in India. (2 500 words and fig.)

1935 621 .9 (.42)
Railway Gazette, No. 22, May 31, p. 1072.
A new machine tool for locomotive running and repair depots. (650 words and fig.)

1935 385. (091(.56)
Railway Gazette, No. 22, May 31, p. 1073.
Ottoman Railway from Smyrna to Aidin. (1 300 words and fig.)

1935 625 .17
Railway Gazette, No. 23, June 7, p. 1112.
HULL (Lt.-Col. H. A.). — **Railway maintenance problems.** — VI. — **Permanent way.** (2 800 words and fig.)

1935 621 .13 (0 & 621 .43 (.0
Railway Gazette, No. 23, June 7, p. 1114.
The future of the steam locomotive. (700 words.)

1935 625 .143.1 (.47)
Railway Gazette, No. 23, June 7, p. 1115.
New Russian **standard rail.** (700 words and fig.)

1935 621 .133.1
Railway Gazette, No. 23, June 7, p. 1116.
DARLING (C. S.). — **Coal selection for locomotive work.** (1 200 words.)

1935 625 .7 (.43)
Railway Gazette, No. 23, June 7, p. 1119.
German State motor roads. (2 800 words and fig.)

1935 656 .1 (.94)
Railway Gazette, No. 23, June 7, p. 1123.
ARTHURTON (A. W.). — **Road and rail in Australia.** (2 000 words and fig.)

1935 **621 .9 (.42)**
Railway Gazette, No. 23, June 7, p. 1125.
New forging machines for bolt and rivet work. (650 words and fig.)

1935 **625 .144.4 (.42)**
Railway Gazette, No. 24, June 14, p. 1147.
Mechanised permanent way maintenance. (250 words and fig.)

1935 **621 .131**
Railway Gazette, No. 24, June 14, p. 1155.
DIAMOND (E. L.). — **The horse-power of locomotives, its calculation and measurement. — III.** (3 300 words and fig.)

1935 **656 .25 (.493)**
Railway Gazette, No. 24, June 14, p. 1159.
Signalling on the Belgian National Railways. (3 000 words and fig.)

1935 **621 .132.8 (.436)**
Railway Gazette, No. 24, June 14, p. 1164.
New steam railcar locomotives, Austrian Federal Railways. (1 000 words and fig.)

1935 **621 .43 (.73)**
Railway Gazette, No. 24, June 14, p. 1167.
New streamlined trains, Baltimore and Ohio Railroad. (1 000 words and fig.)

1935 **621 .132.3 (.43) & 621 .132.8 (.43)**
Railway Gazette, No. 25, June 21, p. 1209.
New German **streamlined locomotives.** (1 700 words and fig.)

1935 **621 .138 (.42)**
Railway Gazette, No. 25, June 21, p. 1218.
Improvements at Doncaster works, L. N. E. R. — II. (1 500 words and fig.)

1935 **621 .43 (.82)**
Railway Gazette, No. 25, June 21, p. 1221.
New **rubber-tyred railcar** for the Entre Rios Railways. (900 words and fig.)

1935 **621 .132.5 (.43)**
Railway Gazette, No. 25, June 21, p. 1222.
New 2-8-0 locomotives L. M. S. Ry. (500 words and fig.)

1935 **621 .132.8 (.42)**
Railway Gazette, No. 26, June 28, p. 1251.
New turbine-driven 4-6-2 express locomotive, L. M. S. Ry. (5 600 words and fig.)

1935 **621 .2 & 621 .43**
Diesel Ry. Traction, p. 998, Supplt. to the Railway Gazette, May 17.
Hydraulic couplings and transmissions for railway work. (2 800 words and fig.)

1935 **621 .43 (.73)**
Diesel Ry. Traction, p. 1002, Supplt. to the Railway Gazette, May 17.
America's latest **super-speed (Rail Zeppelin) diesel** train. (1 700 words and fig.)

1935 **621 .43 (.44)**
Diesel Ry. Traction, p. 1004, Supplt. to the Railway Gazette, May 17.
The design and operation of a heavy diesel locomotive. (2 200 words and fig.)

1935 **621 .43**
Diesel Ry. Traction, p. 1008, Supplt. to the Railway Gazette, May 17.
Some **thoughts on streamlined trains.** (900 words and fig.)

1935 **621 .2 & 621 .43**
Diesel Ry. Traction, p. 1010, Supplt. to the Railway Gazette, May 17.
MIALL (S.). — **Transmissions for diesel locomotives and railcars. — The H. and N. fluid power transmission.** (1 600 words and fig.)

1935 **621 .43, 621 .82 & 621 .89**
Diesel Ry. Traction, p. 1182, Supplt. to the Railway Gazette, June 14.
GILL (H. C.). — **The problem of big-end bearings in diesel traction.** (2 500 words and fig.)

1935 **533 (.73), 621 .43 & 656 .221 (.73)**
Diesel Ry. Traction, p. 1184, Supplt. to the Railway Gazette, June 14.
OBER (S.). — **Air resistance of the Burlington Zephyr.** (800 words and fig.)

1935 **621 .43 (.44) & 656 .222.1 (.44)**
Diesel Ry. Traction, p. 1185, Supplt. to the Railway Gazette, June 14.
French railcar practice. (600 words.)

1935 **621 .43 (.45)**
Diesel Ry. Traction, p. 1186, Supplt. to the Railway Gazette, June 14.
A diesel model of Italian standard petrol car. (1 000 words and fig.)

1935 **621 .43**
Diesel Ry. Traction, p. 1188, Supplt. to the Railway Gazette, June 14.
KOFFMANN (J. L.). — **The driving position in diesel railcars.** (1 400 words and fig.)

1935 **621 .43 (.43)**
Diesel Ry. Traction, p. 1190, Supplt. to the Railway Gazette, June 14.
German lightweight railway diesels. (300 words and fig.)

1935 **621 .43 (.41)**
Diesel Ry. Traction, p. 1191, Supplt. to the Railway Gazette, June 14.
Heavy suburban service twin diesel car for Great Northern of Ireland Railway. (400 words and fig.)

1935 **621 .43 (.44)**
Diesel Ry. Traction, p. 1192, Supplt. to the Railway Gazette, June 14.
New standard-gauge shunters in France. (800 words and fig.)

1935 **621 .43 (.492)**
Diesel Ry. Traction, p. 1193, Supplt. to the Railway Gazette, June 14.
The **Dutch diesel-electric trains.** — Another statement by Mr. HUPKES, the Chief Mechanical Engineer. (600 words and fig.)

1935 **621 .43 (.54)**
Diesel Ry. Traction, p. 1194, Supplt. to the Railway Gazette, June 14.
Big locomotive oil engines for India. (700 words and fig.)

1935 **621 .33 (.44)**
Electric Ry. Traction, p. 882, Supplt. to the Railway Gazette, May 3.
Important **French electrification opening.** (700 words and fig.)

1935 **621 .33 (.43)**
Electric Ry. Traction. p. 884, Supplt. to the Railway Gazette. May 3.
REICHEL (W.). — **High speed electric railway traction.** (2 000 words and fig.)

1935 **621 .33 (.81)**
Electric Ry. Traction, p. 888, Supplt. to the Railway Gazette, May 3.
Electrification of the Central Railway of Brazil. (3 800 words and fig.)

1935 **621 .33 (.94)**
Electric Ry. Traction, p. 1091, Supplt. to the Railway Gazette, May 31.
ARTHURTON (A. W.). — **Suburban railway electrification in Austria.** (1 900 words and fig.)

1935 **621 .333 (.945) & 621 .39 (.945)**
Electric Ry. Traction, p. 1094, Supplt. to the Railway Gazette, May 31.
Crack detection in traction motor gears. (1 500 words and fig.)

1935 **621 .336 (.43)**
Electric Ry. Traction. p. 1096, Supplt. to the Railway Gazette. May 31.
A new type of **pantograph shoe holder.** (200 words and fig.)

1935 **621 .33 (.68)**
Electric Ry. Traction, p. 1097. Supplt. to the Railway Gazette, May 31.
Running experiences on a D. C. suburban system. (1 000 words and fig.)

1935 **621 .13 & 621 .335**
Electric Ry. Traction, p. 1098, Supplt. to the Railway Gazette, May 31.
The advantages of **railway electrification** with regard to **acceleration and deceleration.** (1 600 words and fig.)

1935 **621 .33 (.42)**
Electric Ry. Traction, p. 1277, Supplt. to the Railway Gazette, June 28.
The Eastbourne and Hastings electrification, Southern Railway. — A résumé of Southern electrification history. — Traffic operation. — Civil engineering works. — Power supply and distribution. — New electric rolling stock. (10 200 words and fig.)

1935 **385 .113 (.42)**
Supplt. to the Railway Gazette, April 26, p. 805.
Financial and operating results of the British Group Railways in 1934. (28 tables.)

Railway Magazine. (London.)

1935 **656 .251 (.44)**
Railway Magazine, June, p. 395.
LASCELLES (T. S.). — **Signboards** on French Railways. (2 300 words.)

1935 **656 .222.1 (.42)**
Railway Magazine, June, p. 398.
ALLEN (C. J.). — **British locomotive practice and performance.** (4 200 words, tables and fig.)

1935 **7 & 656 .22**
Railway Magazine, June, p. 412.
EARLEY (M. W.). — **Train photography.** (5 200 words and fig.)

1935 **385 .1 (.493)**
Railway Magazine, June, p. 425.
LEE (Ch. E.). — **The Railways of Belgium.** (3 200 words and fig.) (To be continued.)

Railway Mechanical Engineer. (New York.)

1935 **625 .232 (.73)**
Railway Mechanical Engineer, May, p. 171.
Light-weight passenger trains for the Baltimore and Ohio. (2 300 words and fig.)

1935 **621 .132.3 (.73)**
Railway Mechanical Engineer, May, p. 176.
Baltimore and Ohio builds two **high-speed locomotives.** (2 500 words, 1 table and fig.)

1935 **536 & 621 .133**
Railway Mechanical Engineer, May, p. 180.
VINCENT (H. S.). — **Heat transmission** in locomotive boilers. (2 100 words, 20 tables and fig.)

1935 **621 .43 (.73)**
Railway Mechanical Engineer, May, p. 185.
New Haven « Comet » embodies unusual features of design. (5 400 words and fig.)

1935 **625 .253**
Railway Mechanical Engineer, May, p. 192.
McCUNE (J. C.). — **High-speed air-brake tests.** (2 800 words.)

1935 **625 .253 (.73) & 625 .26 (.73)**
Railway Mechanical Engineer, May, p. 199.
Repairing triple valves at Pitcairn shop. (3 300 words and fig.)

1935 **621 .138 & 625 .26**
Railway Mechanical Engineer, June, p. 217.
FREEMAN (L. D.). — **Railway equipment maintenance.** (3 200 words.)

1935 **621 .138 (.73)**
Railway Mechanical Engineer, June, p. 220.
Locomotive maintenance facilities at Oelwein improved (4 000 words and fig.)

1935 **536 & 621 .133**
Railway Mechanical Engineer, June, p. 228.
VINCENT (H. S.). — **Heat transmission** in locomotive boilers. (1 600 words and fig.)

1935 **621 .132.3 (.73)**
Railway Mechanical Engineer, June, p. 232.
Milwaukee **streamlined high-speed locomotives.** (3 600 words, tables and fig.)

1935 **621 .135.2 (.73)**
Railway Mechanical Engineer, June, p. 240.
Locomotive **flange greaser.** (350 words and fig.)

Railway Signaling. (Chicago.)

1935 **656 .256.3 (.73)**
Railway Signaling, May, p. 245.
Coded track-circuit signaling on the Pennsylvania. (4 800 words and fig.)

1935 **625 .162 (.73) & 656 .259 (.73)**
Railway Signaling, May, p. 253.
Traffic type crossing signals on the Texas and New Orleans in El Paso. (1 600 words and fig.)

1935 **656 .254 (.73) & 656 .258 (.73)**
Railway Signaling, May, p. 256.
Electric interlocking in snow sheds on the Southern Pacific. (3 000 words and fig.)

1935 **621 .31 & 656 .25**
Railway Signaling, May, p. 261.
PETER (L. H.). — **Rectifier applications in railway signaling.** (3 000 words and fig.)

1935 **656 .254 (.73)**
Railway Signaling, May, p. 263.
WYANT (L.). — **Automatic OSing devices** used by the Rock Island. (1 000 words and fig.)

1935 **656 .256.2 (.73)**
Railway Signaling, June, p. 295.
New York Central extends South Bend **interlocking.** (1 900 words and fig.)

1935 **656 .256**
Railway Signaling, June, p. 298.
Modern **track relays** lengthen primary battery life. (1 300 words and fig.)

1935 **656 .256.3 (.73)**
Railway Signaling, June, p. 300.
New **automatic signals** increase track capacity and safety on the Erie. (1 500 words and fig.)

1935 **656 .259 (.73)**
Railway Signaling, June, p. 303.
Depression operation of **interlocking** (Electric switch locks protect crossing). (1 300 words and fig.)

1935 **625 .162 (.73) & 656 .259 (.73)**
Railway Signaling, June, p. 305.
Automatic interlocking involves highway crossing signals. (1 000 words and fig.)

1935 **625 .162 (.73) & 656 .259 (.73)**
Railway Signaling, June, p. 306.
Auto-stop installed on C. and N. W. (**Automatically-controlled barrier type protection at crossing.**) (3 300 words and fig.)

1935 **656 .258 (.73)**
Railway Signaling, June, p. 312.
STAHL (W. A.). — Consolidation of **interlockings** at Houston, Texas. (1 500 words and fig.)

South African Railways and Harbours Magazine. (Johannesburg.)

1935 **621 .43 (.67)**
South Afric. Rys. and Harb. Magazine, May, p. 567.
Railcars for C. F. M. Lourenço Marques constructed at Durban Workshops. (1 600 words and fig.)

1935 **385 .(091 (.68)**
South Afric. Rys. and Harb. Magazine, June, p. 675.
WATERMEYER (T. H.). — **South Africa's State Railway System, 1910-1935.** (4 500 words and fig.)

1935 **621 .133.7 (.68) & 725 .33 (.68)**
South Afric. Rys. and Harb. Magazine, June, p. 693.
Research activities in the Mechanical Department. — **Water treatment plants.** (1 900 words and fig.)

Transactions, American Society of Mechanical Engineers. (New York.)

1935 **621 .83**
Transactions, Amer. Soc. of Mech. Engineers, April, p. 97.
BARTLETT (G. M.). — A new **basis for the rating of roller-chain drives.** (6 000 words, 4 tables and fig.)

1935 **536**
Transactions, Amer. Soc. of Mech. Engineers, April, p. 105.
CROFT (H. O.) & SCHMARJE (C. F.). — **Radiation intensities and heat transfer by radiation in boiler furnaces.** (4 200 words and fig.)

1935 **621 .111**
Transactions, Amer. Soc. of Mech. Engineers, April, p. 115
EGLI (A.). — **The leakage of steam through labyrinth seals.** (3 800 words and fig.)

1935 **621 .43 & 625 .232**
Transactions, Amer. Soc. of Mech. Engineers, April, p. 128.
The design of light-weight trains. — Discussion of paper RR-56-4, by R. EKSERGIAN, in the September 1934 issue of the A. S. M. E. Transactions. (5 800 words, tables and fig.)

1935 **621 .116 & 669 .1**
Transactions, Amer. Soc. of Mech. Engineers, May, p. 145.
FISHER (F. F.) & COPE (E. T.). — **Rolling-in of boiler tubes.** (6 800 words and fig.)

1935 **621 .111 & 621 .165**
Transactions, Amer. Soc. of Mech. Engineers, May, p. 153.
HELANDER (L.). — **Steam-turbine leaving losses and vacuum corrections.** (4 500 words and fig.)

1935 **621.**
Transactions, Amer. Soc. of Mech. Engineers, May, p. 159.
MITEREFF (S. D.). — Principles underlying the rational solution of **automatic-control** problems. (5 600 words and fig.)

1935 **621 .82 & 621 .89**
Transactions, Amer. Soc. of Mech. Engineers, May, p. 169.
HOWARTH (H. A. S.). — **The loading and friction of thrust and journal bearings with perfect lubrication.** (16 000 words and fig.)

Transit Journal. (New York.)

1935 **625 .62 (.73)**
Transit Journal, May, p. 149.
New cars planned for Brooklyn. (2 000 words and fig.)

1935 **621 .335 (.73) & 625 .62 (.73)**
Transit Journal, June, p. 176.
Street cars in the 1935 mode. (500 words and fig.)

1935 **625 .4 (.47)**
Transit Journal, June, p. 180.
Moscow opens its new subway. (1 900 words and fig.)

The Locomotive. (London.)

1935 **621 .132.3 (.493)**
The Locomotive, May 15, p. 136.
Four-cylinder simple expansion locomotive type 1, Belgian National Railways. (800 words and fig.)

1935 **621 .135.3**
The Locomotive, May 15, p. 143.
SANDERS (T. H.). — **Lubrication of laminated springs.** (3 200 words and fig.)

1935 **621 .43 (.460)**
The Locomotive, May 15, p. 147.
Air-cooled Diesel engines for railcar service. (1 600 words and fig.)

1935 **621 .132.3 (.44)**
The Locomotive, May 15, p. 161.
Improved « Pacific » locomotives, P.L.M. Railway. (1 800 words and fig.)

1935 **121 .137.3**
The Locomotive, June 15, p. 167.
Pooling of locomotives. (1 600 words and fig.)

1935 **621 .133.5**
The Locomotive, June 15, p. 171.
The blast-pipe. — Increased boiler efficiency. (1 200 words and fig.)

1935 **621 .132.8 (.82)**
The Locomotive, June 15, p. 173.
High-speed « Beyer-Garratt » locomotives on the Sao Paulo (Brazil) Railway. (200 words and fig.)

1935 **621 .132.5 (.68)**
The Locomotive, June 15, p. 174.
4-8-2 type locomotives, South African Railways. (900 words and fig.)

1935 **621 .132.8 (.436)**
The Locomotive, June 15, p. 175.
Light locomotive for railcar services, Austrian Federal Railways. (1 900 words and fig.)

1935 **385 (091 (.85)**
The Locomotive, June 15, p. 180.
JUKES (M. F.). — The Central Railway of Peru. — **The highest railway in the world and its motive power.** (Concluded from page 165.) (2 000 words and fig.)

1935 **621 .88**
The Locomotive, June 15, p. 196.
Bolt and stud schedules. (2 400 words and fig.)

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1935 **621 .33 (.460)**
Anales de la Asociación de Antiguos Alumnos del I. C. A. I., mayo, p. 239; junio, p. 283.
GIBERT Y SALINAS (A.). — La **electrificación** de los ferrocarriles, problema nacional. (7 900 palabras & fig.) (Continuará.)

1935 **621 .392**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., mayo, p. 248; junio, p. 302.

ECHEVARRIA REZOLA (S. de). — Notas sobre **soldadura eléctrica** como elemento de construcción. (Soldadura del acero laminado y forjado.) (7 600 palabras, 3 cuadros y fig.) (Contínuará.)

1935 **669 .1**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., junio, p. 296.

VAZQUEZ Y LOPEZ (J.). — Defectos en el acero. (3 000 palabras & fig.) (Contínuará.)

Caminos de hierro. (Madrid.)

1935 **385. (09.3**

Caminos de hierro, junio, p. 152.

SUMALLA (J.). — Sobre la **historia de los ferrocarriles.** (3 600 palabras & fig.)

Ferrocarriles y Tranv as. (Madrid.)

1935 **388 & 625 .4**

Ferrocarriles y Tranvias, mayo, p. 130.

LAFFITTE (C.). — Notas relativas a **ferrocarriles metropolitanos.** (2 500 palabras.)

1935 **656 .235.7**

Ferrocarriles y Tranvías, mayo, p. 136.

SIERRAGORDA (Conde de). — **Los servícios agrícolas** en los ferrocarriles. (2 000 palabras, 2 cuadros y fig.)

1935 **621 .43 (.460)**

Ferrocarriles y Tranvías, junio, p. 178.

Un **automotor** utilitario de construcción nacional. (600 palabras & fig.)

Ingenieria y Construcción (Madrid).

1935 **621 .132.8**

Ingenieria y Construcción, julio, p. 461.

La aplicación de los **generadores Velox a la tracción por vapor.** (1 000 palabras & fig.)

Los Transportes. (Madrid.)

1935 **656**

Los Transportes, N° 400, 15 de mayo, p. 111.

La **competencia** entre el ferrocarril y la carretera. (1 800 palabras & fig.)

Revista de Ingenieria industrial. (Madrid.)

1935 **625 .1 (.518)**

Revista de Ingenieria industrial, junio, p. 196.

RAHOLA (S.). — Los **ferrocarriles** en Manchuria. (2 500 palabras & 1 mapa.)

Revista del Colegio de Ingenieros de Venezuela (Caracas-Venezuela).

1935 **624 .2 (.87)**

Revista del Colegio de Ingenieros de Venezuela, marzo-abril, p. 1285.

OLIVARES (A. E.). — Estudio sobre las cargas que pueden adoptarse en **cálculo de los puentes de carretera** en Venezuela. (3 800 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1935 **656 .254**

Revista de Obras Públicas, N° 11, 1° de junio, p. 215.

WAIS (F.). — **La repetición de señales sobre la locomotora.** (3 700 palabras & fig.)

1935 **656**

Revista de Obras Públicas, N° 13, 1° de julio. p. 249.

CODERCH (R.). — **El carril, la carretera, el agua.** (Le rail, la route, l'eau.) (5 000 palabras.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1935 **624 .63 (.45)**

Annali dei lavori pubblici, novembre, p. 956.

DI NAPOLI (A.). — **Ponte ferroviario in calcestruzzo** della luce di M. 40 sul torrente Acquabianca. (2 200 parole & fig.)

1935 **624 .2**

Annali dei lavori pubblici, novembre, p. 965.

LETTERIO F. DONATO. — Contributo allo studio delle **deformazioni nelle travi reticolari.** (1 600 parole, 2 tabelle & fig.)

La tecnica professionale. (Firenze.)

1935 **385 .587 (.45)**

La tecnica professionale, giugno, p. 17.

La rilevazione dei tempi. (4 500 parole & fig.)

1935 **625 .258**

La tecnica professionale, luglio, p. 193.

ZATTONI. — **Freni elettromagnetici a pattino.** (1 200 parole & fig.)

L'Ingegnere. (Roma.)

1935 **624 .63**

L'Ingegnere, giugno, p. 397.

GUIDI (C.). — **Solette in beton armato** per ponti carreggiabili. (1 000 parole & fig.)

1935 **62. (01**

L'Ingegnere, luglio, p. 489.

GIOVANNINI (M.). — **Sulla prova di resistenza dei materiali all'usura per attrito radenti.** (5 000 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1935 **621 .335 (.45)**

Rivista tecnica delle ferrovie italiane, 15 maggio, p. 255.

BIANCHI (G.). — Le **locomotive a corrente continua** a 3 000 volt Gr° E. 428. (4 300 parole & fig.)

1935 **625 .1 (.45)**

Rivista tecnica delle ferrovie italiane, 15 maggio, p. 280.

DE MARTINO (V.). — Il tronco Ostiglia-Legnago della **nuova linea ferroviaria Ostiglia-Treviso.** (4 800 parole & fig.)

1935 **62. (01**

Rivista tecnica delle ferrovie italiane, 15 maggio, p. 291.

FORCELLA (P.). — **Prove comparative preliminari di torsione alterna dinamica** fatte con la macchina « Losenhausen » per dimostrare l'influenza nociva delle punzonature a freddo effettuate sulle superfici di organi metallici sottoposti a torsioni dinamiche alterne. (1 800 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1935 **62. (01 & 721 .9**

De Ingenieur, N° 23. 7 Juni, p. Bt. 37.

BIJLAARD (P. P.). — **Afleiding van eenvoudige formules voor de berekening van rechthoekige op vier zijden opgelegde platen in gewapend beton voor gelijkmatige volbelasting.** (13 000 woorden & fig.)

1935 **62 .(01**

De Ingenieur, N° 25, 21 Juni, p. Mk. 13.

COHEN (E.). — **Allotropie en corrosie.** (8 400 woorden, 6 tabellen & fig.)

1935 **624 .8 (.492)**

De Ingenieur, N° 26, 28 Juni, p. B. 121.

SCHIJFSMA (H. A.). — De **hefbrug** over de Oude Maas bij Spijkenisse. (7 800 woorden & fig.)

1935 **624 .32 (.492)**

De Ingenieur, N° 26, 28 Juni, p. B. 133.

HARMSEN (W. J. H.). — De **brug** voor gewoon verkeer over het Hollandsche Diep bij Moerdijk. (3 600 woorden & fig.)

1935 **656 .257 (.492) & 721 .9 (.492)**

De Ingenieur, N° 7, 5 Juli, p. Bt. 53.

VAN RAVESTEYN (S.). — **Seinhuis** te Maastricht. (2 300 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1935 **621 .43**

Spoor en Tramwegen, N° 12, 4 Juni, p. 271.

HARDEMAN (W. F. K.). — **De Diesel-motor voor tractie.** (2 500 woorden & fig.) (Wordt vervolgd.)

1935 **385. (09.3 (.43)**

Spoor en Tramwegen, N° 12, 4 Juni, p. 277.

HUIZER (S. L.). — De « **Ludwigsbahn** » van Neurenberg naar Fürth. (1 800 woorden & fig.)

1935 **625 .232 (.492)**

Spoor en Tramwegen, N° 12, 4 Juni, p. 282.

BOLLEMAN KIJLSTRA (E.). — **Nieuwe doorgangsrijtuigen** der Nederlandsche Spoorwegen. (600 woorden & fig.)

1935 **656 (.492)**

Spoor en Tramwegen, N° 11, 21 Mei, p. 247.

Coördinatie bij Noodverordening. (2 000 woorden.)

1935 **621 .132.1 (.44)**

Spoor en Tramwegen, Nr. 13, 18 Juni, p. 298.

ROSENTHAL (G. A.). — **Stoomlocomotieven** van de Paris-Orleans. (2 200 woorden & fig.)

1935 **621 .43**

Spoor en Tramwegen, Nr. 13, 18 Juni, p. 301; Nr. 15, 16 Juli, p. 349.

HARDEMAN (W. F. K.). — De **Diesel-motor voor tractie.** (3 500 woorden & fig.) (Wordt vervolgt.)

1935 **313 : 656 (.494)**

Spoor en Tramwegen, Nr. 13, 18 Juni, p. 303.

De bewerking van de **bedrijfstatistiek** bij de Zwitsersche Bondsspoorwegen. (2 300 woorden & fig.)

In Polish.

(= 91.885)

Inżynier Kolejowy. (Warszawa).

1933 **621 .33 (.438) = 91 .885**

Inzynier Kolejowy, No. 7, p. 164.

BRUSKI-KASYNA. — History and development of **electric traction.** — Future prospects as regards electrification of Polish main lines. (4 550 words and fig.)

1933 **624 .2 = 91 .885**

Inzynier Kolejowy, No. 7, p. 168.

BRYLA. — The « Geiger » **extensometer** used for testing steel railway bridges. (5 200 words and fig.)

1933 **656 (.438) = 91 .885**

Inzynier Kolejowy, No. 9, p. 232.

WASIUTYNSKI. — **Rail-road co-ordination in Poland.** (5 200 words.)

1934 **721 .1 = 91 .885**

Inzynier Kolejowy, No. 2, p. 31.

WIERZBICKI. — **The ground thrust against retaining walls.** (5 850 words and fig.)

1934 **621 .131.3 (.438) = 91 .885**

Inzynier Kolejowy, No. 2, p. 39.

SEIDLER. — **Test results of new locomotives for fast trains, Polish State Railways.** (5 200 words and diagr.)

Inzynier Kolejowy, No. 4, p. 84.

1934 **625 .142.2 (.438) = 91 .885**

HUMMEL. — **Repairing wooden railway sleepers,** Polish State Railways. (3 250 words and fig.)

1934 **621 .33 (.438) = 91 .885**

Inzynier Kolejowy, No. 5, p. 110; No. 6, p. 147; No. 7, p. 167; No. 8, p. 182.

ARLITEWICZ. — **The railway electrification problem** in Poland. (19 500 words.)

1934 **385 .587 (.438) = 91 .885**

Inzynier Kolejowy, No. 6, p. 126.

CZARKOWSKI. — Principles governing the rational **reorganisation of workshops,** Polish State Railways. (3 250 words.)

1934 **385 .524 (.438) = 91 .885**

Inzynier Kolejowy, No. 6, p. 127.

FELSZ. — **The premium system** and its advantages, Polish State Railways (workshops, running sheds, locomotive coal savings. (10 400 words.)

1934 **625 .143.2 = 91 .885**

Inzynier Kolejowy, No. 6, p. 135.

ABSOLON & FESZCZENKO-CZOPIOWSKI. — **Hardening the head of rails** by the « Huta Pokoj » process. (6 500 words, diagr. and fig.)

1934 **385. (07.4 (.438) = 91 .885**

Inzynier Kolejowy, No. 7, p. 159.

WASILEWSKI. — Creation of the **Communications Museum** on the occasion of the building of the Technical and Industrial Museum. (4 550 words.)

1934 **656 .222.1 = 91 .885**

Inzynier Kolejowy, No. 10, p. 230.

EBERHARDT. — **Passenger train speeds in Poland** and elsewhere. (5 850 words.)

1934 **625 .26 = 91 .885**

Inzynier Kolejowy, No. 12, p. 269.

JUNGIER. — **Repairing wagon springs.** (7 800 words and diagr.)

1935 **656 .225 = 91 .885 & 656 .261 = 91 .885**

Inzynier Kolejowy, May, p. 117.

NIKOLAJEW (W.). — Transport in **containers.** (13 200 words and fig.)

1935 **624 .6 = 91 .885**

Inzynier Kolejowy, May, p. 135.

WIERZBICKI. — **Note on the statical calculation of circular arcs.** (3 600 words, 3 tables and fig.)

1935 **625 .5 = 91 .886**

Inzynier Kolejowy, May, p. 144; June, p. 171.

RAABE (E.). — **Telpher lines.** (9 000 words, 9 tables and fig.)

1935 **625 .113 = 91 .885**

Inzynier Kolejowy, June, p. 161.

JACYNA (W.). — The adjustment of **curves.** (7 200 words and fig.)

1935 **621 .13 = 91 .885**

Inzynier Kolejowy, July, p. 193.

LANGROD (A.). — Decline or fresh progress of the **steam locomotives.** (9 000 words and fig.)

1935 **621 .392 = 91 .885 & 625 .143.4 = 91 .885**

Inzynier Kolejowy, July, p. 213.

CHRZASTOWSKI (K.). — **Welding of rails.** (1 500 words and fig.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa.)

1935 **656 (.469)**

Gazeta dos caminhos de ferro, N° 1139, 1 de junho, p. 235.

DE SOUSA (J. F.). — **A crise actual de viaçao** e os nossos caminhos de ferro de via estreita. (2 700 palavras.)

In Rumanian.

(= 599)

Revista tecnica C. F. R. (Bucuresti.)

1933 **656 .212.5 (.498) = 599**

Revista tecnica C. F. R., Nos. 5-6, p. 154.

BARTOLOMEU. — The new **marshalling yard** at Bucharest-Grivitza. (12 000 words and fig.)

1933 **625 .13 (.498) = 599**

Revista tecnica C. F. R., Nos. 5-6, p. 165.

STEFANESCU. — **Reconditioning the Timisul de Sus tunnel,** Rumania. (9 600 words and fig.)

1933 **625 .143 (.498) = 599**

Revista tecnica C. F. R., Nos. 7-8, p. 215.

LADANG. — **Standardization of rail types** on the Rumanian State Railways. (4 050 words, diagr. and 2 tables.)

1933 **625 .156 = 599**

Revista tecnica C. F. R., Nos. 11-12, p. 322.

GANEA. — The mobile **buffer stops** of the « Rawie » type in terminal stations. (6 000 words and fig.)

1933 **656 .21 (01 (.437) = 599**

Revista tecnica C. F. R., Nos. 11-12, p. 332.

IBL. — **The problem of the Prague stations.** (2 400 words and 2 cartes.)

In Serbian.
(= 91.882)

Saobračajni Pregled. (Beograd).

1933-34 **625 .111 = 91 .882 & 656 = 91 .882**
Saobracajni Pregled, No. 7, p. 292; No. 12, p. 503; No. 1, p. 7; No. 2, p. 69.
PETROVIC. — **Railway operation.** Method for analysing an alternative layout of a projected line, from the operating point of view. (26 550 words and diagr.)

1933 **691 = 91 .882**
Saobracajni Pregled, No. 7, p. 305.
KOKAREV. — **Corrosion of various metals.** (3 600 words.)

1933 **621 .4 (.497.1) = 91 .882**
Saobracajni Pregled, No. 7, p. 309.
MILOSEVIC. — Tests of a **petrol locotractor** for shunting duties. (3 600 words and fig.)

1933 **625 .234 = 91 .882**
Saobracajni Pregled, No. 9, p. 344; No. 10, p. 429; No. 12, p. 514.
MATASOV. — **Steam heating of passenger coaches.** (High-pressure. — Hot water heating.) (18 900 words and fig.)

1933 **625 .144.2 = 91 .882**
Saobracajni Pregled, No. 9, p. 375.
STEHLIK. — **Track laying. Track gauge widening and superelevation in relation to high speeds.** (10 800 words and fig.)

1933 **625 .143.5 = 91 .882**
Saobracajni Pregled, No. 9, p. 387.
CHOROSAVIN. — **Rail creep in curves.** (2 700 words and fig.)

1933 **621 .133.3 = 91 .882**
Saobracajni Pregled, No. 9, p. 390.
Maintenance and repair of locomotive boiler tubes and flues. (7 200 words and fig.)

1933 **621 .133.3 = 91 .882**
Saobracajni Pregled, No. 9, p. 398.
LONCAREVIC. — **Design of modern railcars.** (5 400 words and fig.)

1933 **625 .142.2 (.497.1) = 91 .882**
Saobracajni Pregled, No. 10, p. 417.
Species of wood suitable for making railway sleepers for the Jugoslav State Railways. (11 250 words and diagr.)

1933 **656 .212.5 = 91 .882**
Saobracajni Pregled, No. 10, p. 441.
RAKOCEVIC. — The part played by **shunting yards** in the organisation of railway operation. (1 350 words.)

1933 **656 .225 (.497.1) = 91 .882**
Saobracajni Pregled, No. 10, p. 443.
KOSTIC. — **Light goods trains** on the Jugoslav State Railways (« Lasta » trains). (1 800 words.)

1933-34 **656 .224 = 91 .882**
Saobracajni Pregled, No. 10, p. 455; No. 4, p. 173.
ROZMAN. — **Railway and customs.** (11 700 words.)

1933 **621 .139 (.497.1) = 91 .882,**
625 .18 (.497.1) = 91 .882
& 625 .27 (.497.1) = 91 .882
Saobracajni Pregled, No. 12, p. 463.
RAJKER. — **Centralisation, decentralisation and reorganisation of the Stores Department and its accounts, Jugoslaw State Railways.** (3 600 words and 2 tables.)

1933 **656 .223.2 = 91 .882**
Saobracajni Pregled, No. 12, p. 472.
DOLINAR. — **Union of « Little Entente » and Polish State Railways for the International Exchange of Wagons (R. I. G.).** (1 350 words.)

1933 **385 .63 = 91 .882**
Saobracajni Pregled, No. 12, p. 476.
GREGORKA. — **Use of the various languages in the International Agreement for the carriage of goods. (C. I. M.)** (3 600 words.)

1933 **385. (07 (.436 + .437 + .494) = 91 .882**
Saobracajni Pregled, No. 12, p. 498.
REPIC. — **Staff training schools** of the different railway administrations (Switzerland, Austria, Czechoslovakia). (3 150 words.)

1933 **669 .1 = 91 .882**
Saobracajni Pregled, No. 12, p. 524.
KOKAREV. — **Effect of cold-working on the mechanical qualities of steel and iron.** (2 700 words and 1 diagr.)

1934 **621 .139 (.497.1) = 91 .882**
625 .18 (.497.1) = 91 .882
& 625 .27 (.497.1) = 91 .882
Saobracajni Pregled, No. 1, p. 17.
ISAKOVIC. — **Reorganisation of the Stores Department** of the Jugoslav State Railways. (8 550 words.)

1934 **385. (07 (.43 + .489 + .493) = 91 .882**
Saobracajni Pregled, No. 1, p. 27.
REPIC. — **Staff training school** of the various Railway Administrations (Belgium, Denmark, Germany). (4 500 words.)

1934 **656 .253 = 91 .882**
Saobracajni Pregled, No. 1, p. 45.
FORGIC. — **Three-indication warning signal.** (1 800 words and fig.)

1934 **625 .173 = 91 .882**
Saobracajni Pregled, No. 2, p. 57; No. 5, p. 222.
MILER-PETRIC. — **Mechanical track relaying.** (3 600 words and fig.)

1934 **625 .233 (.497.1) = 91 .882**

Saobracajni Pregled, No. 2, p. 78.

Electric lighting of railway coaches, Jugoslav State Railways. (9 000 words, diagr. and fig.)

1934 **385. (07 (.42 + .44 + .485) = 91 .882**

Saobracajni Pregled, No. 3, p. 132.

REPIC. — **Staff training schools** of the various Railway Administrations (France, Great Britain, Sweden). (3 600 words.)

1934 **621 .33 (.497.1) = 91 .882**

Saobracajni Pregled, No. 4, p. 158.

RUJIC. — **Railway electrification.** Projected electrification of the Zagreb-Cakavac line, Jugoslavia. (6 750 words, 1 table and fig.)

1934 **625 .173 = 91 .882 & 665 .882 = 91 .882**

Saobracajni Pregled, No. 4, p. 184.

Autogenous welding of crossings with addition of metal. (5 850 words and fig.)

1934 **621 .43 (.437) = 91 .882**

Saobracajni Pregled, No. 5, p. 204.

MILER-PETRIC. — The « Blue Arrow » railcar of the Czechoslovak State Railways. (1 800 words and fig.)

1934 **385 .15 = 91 .882**

Saobracajni Pregled, No. 5, p. 206.

REPIC. — **Autonomy of the State Railways.** (Concluded.) (5 400 words.)

1934 **385. (07) = 91 .882**

Saobracajni Pregled, No. 5, p. 223.

REPIC. — **Staff training schools** of the various Railway Administrations (Russia, Bulgaria, Esthony, Netherlands, Finland, Ireland, Greece, Italy, Albany, Turkey, Hungary, Lettony, Norway, Lithuany, Poland, Portugal, Rumania, Spain, Luxemburg, U.S.A., Japan). (Concluded.) (4 500 words.)

1934 **691 = 91 .882**

Saobracajni Pregled, No. 6, p. 241.

KRICK. — **Protection of metal structures against rust.** (12 150 words.)

1934 **625 .143.2 = 91 .882**

Saobracajni Pregled, No. 6, p. 268.

MILER-PETRIC. — **Manganese steel rails** manufactured in the electric furnace. (2 700 words.)

1934 **621 .131.1 = 91 .882 & 625 .113 = 91 .882**

Saobracajni Pregled, No. 8, p. 321.

GREBENAROVIC. — **Effect of steep gradients** on railway lines on the tractive effort of locomotives of these lines. (4 500 words.)

1934 **669 .1 = 91 .882**

Saobracajni Pregled, No. 8, p. 335.

KOKAREV. — **Cementation of steel.** (4 500 words and diagr.)

1934 **016 .385 = 91 .882**

Saobracajni Pregled, No. 8, p. 355.

DRACINSKI. — **The decimal classification system** in railway libraries. (3 150 words and diagr.)

1934 **625 .113 = 91 .882**

Saobracajni Pregled, No. 8, p. 369; No. 10, p. 419; No. 11, p. 453.

Railway curves. (20 000 words and fig.)

1934 **625 .253 = 91 .882**

Saobracajni Pregled, No. 10, p. 428.

GREBENAROVIC. — The Hildebrand-Knorr **brake,** with a short history of the Knorr and Westinghouse brakes. (8 550 words.)

1934 **625 .143.5 = 91 .882**

Saobracajni Pregled, No. 11, p. 460.

MILER-PETRIC. — **Effect of fishplates and chairs on rail creep.** (3 600 words and fig.)

1934 **625 .253 = 91 .882**

Saobracajni Pregled, No. 11, p. 464.

REPIC. — **Sequence and overtaking of trains.** (8 550 words and fig.)

1934 **656 .214 = 91 .882**

Saobracajni Pregled, No. 11, p. 473.

FINC. — **Calculation of working costs in respect of joint lines and joint stations.** (5 850 words and diagr.)

In Czech.

(= 91.886)

Zeleznični Revue. (Praha.)

1933 **385 (.437) = 91 .886**

Zeleznicni Revue, No. 12, p. 177.

CMELAR. — A few problems of **railway economics** with special reference to the Czechoslovak State Railways (Capital expenditure, working costs, etc.) (4 200 words and diagr.)

1933 **623 = 91 .886**

Zeleznicni Revue, No. 18, p. 273; No. 19, p. 289; No. 20, p. 305.

MALECEK. — **The part played by the railways and motor vehicles in the defence of the country. Comparative efficiency of the methods of transport.** (7 700 words.)

1933 **385 .1 (.437) = 91 .886**
& 385 .524 (.437) = 91 .886

Zeleznicni Revue, No. 19, p. 297.

HAJEK. — **Reorganization of the Czechoslovak State Railways** and application of the commercial management system with participation of the staff. (1 400 words.)

1933 **385 .1 (.437) = 91 .886**
& 385 .524 (.437) = 91 .886

Zeleznicni Revue, No. 21, p. 321.

Investigation into the advisability of introducing the **commercial management system with participation of the staff**, on the Czechoslovak State Railways. (3 150 words.)

Zprávy železničních inženýrů. (Prague.)

1933 **623 = 91 .886**

Zprávy zeleznicních inzenyrú, No. 7, p. 131.

ZDRAZIL. — **The importance of railways as regards the defence of the country.** (5 500 words.)

1933 **625 .144.2 (.437) = 91 .886**

Zprávy zeleznicních inzenyrú, No. 7, p. 135; No. 8, p. 158.

VAVERKA. — Comparison between present-day and projected **superelevations in curves.** Czechoslovak State Railways. (6 050 words, diagr. and fig.)

1935 **656 .257 = 91 .886**

Zprávy zeleznicních inzenyrú, No. 7, p. 139; No. 8, p. 153; No. 9, p. 176; No. 10, p. 197.

HALAVANJA. — **Electrical power plant controlling points and crossing and signals.** (23 100 words and fig.)

1933 **621 .134.3 = 91 .886**

Zprávy zeleznicních inzenyrú, No. 8, p. 164.

LEINER. — **Poppet valve gear** for locomotives. (3 300 words, diagr. and fig.)

1933 **621 .138.1 (.437) = 91 .886**

Zprávy zeleznicních inzenyrú, No. 9, p. 172; No. 10, p. 192.

EISMAN. — **Mechanical plant at the new Bratislava locomotive terminal.** (8 800 words and fig.)

1933 **621 .43 = 91 .886**

Zprávy zeleznicních inzenyrú, No. 9, p. 182; Nr. 10, p. 203; No. 11, p. 217; No. 12, p. 231.

VAJNA. — The selection of suitable **lubricating oils** for explosion engines. (6 050 words.)

1933 **625 .5 = 91 .886**

Zprávy zeleznicních inzenyrú, No. 9, p. 183; No. 10, p. 208.

NEVRLY. — **Funicular and telpher railways.** (6 600 words and diagr.)

1933 **656 .254 (.437) = 91 .886**

Zprávy zeleznicních inzenyrú, No. 11, p. 215; No. 12, p. 225.

KRADL. — **Locomotive cab repeater signals.** Tests of the « Indusi » system in Czechoslovakia. (3 850 words and fig.)

1933 **385. (07.2 (.437) = 91 .886**
& 625 .143.3 (.437) = 91 .886

Zprávy zeleznicních inzenyrú, No. 12, p. 227.

SPAZIER. — **Inspecting and testing defective rails** at the Brno laboratory, Czechoslovak State Railways. (3 300 words and fig.)

M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General Secretary of the Permanent Commission of the International Railway Congress Association.

(OCTOBER 1935)

[016. 385. (02]

I. — BOOKS.

In French.

1935 **621 .31**
BARBILLON (L.).
Utilisation des **forces hydroélectriques.**
Paris, Léon Eyrolles. 1 volume, 682 pages et 514 figures. (Prix : 120 francs français.)

1935 **625 .6 (.43)**
BENNINGHOFF (W.).
Les **transports en commun** et leur réorganisation en Allemagne.
Bruxelles, Secrétariat de l'Union Internationale de Tramways, 18, avenue de la Toison d'Or. 1 rapport, 5 pages.

1935 **621 .4**
DEVILLERS (R.) & MERCES (P.).
Le **moteur à explosions.**
Paris, Dunod. 1 volume, 781 pages, 388 figures et 12 planches. (Prix : Tomes I et II : 385 fr. français.)

1935 **385. (09**
DOLLFUSS (Ch.) & GEOFFROY (E. de).
Histoire de la **locomotion terrestre.** Tome I : Les Chemins de fer.
Paris (9e), Revue de l'*Illustration*, 13, rue Saint-Georges. 1 grand volume in-4° de 376 pages, illustrations et planches hors texte en couleurs. (Prix : 195 francs français.)

1935 **621 .43**
L'autorail.
Paris, Revue Pétrolifère. 1 volume, 148 pages, 128 figures. (Prix : 50 francs français.)

1935 **621 .165 & 621 .4**
LORRAIN (P.).
Les **turbines à vapeur** et à combustion interne.
Paris, Léon Eyrolles. 1 volume, 690 pages, 409 figures et 3 planches. (Prix : 160 francs français.)

1935 **625 .6 (.42)**
MACKINNON (J. P.).
L'évolution de la technique en Grande-Bretagne appliquée aux **transports en commun** au cours des dix dernières années.
Bruxelles, Secrétariat de l'Union Internationale de Tramways, 18, avenue de la Toison d'Or. 1 rapport, 51 pages et figures.

1935 **621 .33**
PARODI (H.) & TETREL (A.).
La **traction électrique** et le **chemin de fer.**
Paris, Dunod. 1 volume, 560 pages, 3 planches et 210 figures. (Prix : 148 francs français.)

1935 **385 (.44) & 656 (.44)**
PESCHAUD (M.).
La **restauration des chemins de fer** et la **coordination des transports.**
Paris (9e), Revue politique et parlementaire, 10, rue Auber. 1 volume (15 × 23), 127 pages.

1935 **665 .882**
SEFERIAN (D.).
Etude de la **formation des nitrures de fer par fusion** et du système fer-azote.
Paris, Institut de soudure autogène, 32, boulevard de la Chapelle. 1 volume, 101 pages, 52 figures et 2 planches. (Prix : 20 francs français.)

1935 **313 .385 (.437)**
Statistique de transport des Chemins de fer de l'Etat tchécoslovaque pour l'exercice 1934.
Praha, Chemins de fer de l'Etat. 1 volume, 234 pages et 1 carte.

1935 **62. (01**
STECCANELLA (A.).
Essais de résilience. Unification internationale de l'éprouvette et d'autres recherches.
Milano, Arti Grafiche Stefano Pinelli, via A. Bordoni, 2. 1 brochure, 31 pages et 38 tableaux.

1935 **625 .6 (06**
Union Internationale de Tramways, de Chemins de fer d'intérêt local et de Transports publics automobiles. Cinquantenaire. 1re partie : Un demi-siècle de travail. 1885-1935.
Bruxelles, Secrétariat de l'Union, 18, avenue de la Toison d'Or. 1 volume, 197 pages et photographies.

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. Weissenbruch, in the number for November 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

In German.

1934 621
BIELITZ (F.).
Mechanische Schwingungen im Maschinenbau.
Berlin, V-D-I-Verlag. 1 Band, 30 Seiten und 77 Abbildungen. (Preis : 5 R.M.)

1935 656 .1 (.43) & 656 .2 (.43)
HEIN (G.).
Gesetz über die **Beförderung von Personen zu Lande.**
Berlin, Verkehrswissenschaftliche Lehrmittelgesellschaft m. b. H. bei der Deutschen Reichsbahn. 1 Band. (Preis : 5.80 R.M.)

1935 665 .882
HOLLER (H.).
Vorkalkulation und Praxis der **Autogenschweissung.**
Halle a/S., Carl Marhold in Komm. 1 Band, 120 Seiten und 70 Abbildungen. (Preis : 2 R.M.)

1935 385 .5 (.43)
KIRSTEN (L.).
Die **Personalpolitik** der Deutschen Reichsbahn-Gesellschaft von 1924 bis 1933.
Leipzig, Akademische Verlagsgesellschaft m. b. H. 1 Band. (Preis : 5.20 R.M.)

1935 621 .116
PFLEIDERER (E.).
Dampfkesselschäden.
Berlin, Julius Springer. 1 Band, 259 Seiten. (Preis : 24 R.M.)

In English.

1935 621 .31
BARROWS (H. K.).
Water power engineering.
London. McGraw-Hill Publishing Company, Ltd. Second edition. (Price : 36 sh. net.)

1935 656 .231 (.54)
BECKETT (A. W.), personal assistant to Agent, Bengal Nagpur Railway.
The Indian Railway rates' structure. — The case for its simplification. Its existing shortcomings and suggested principles as a basis for its revision.
Delhi. Copies obtainable from the Manager of Publications. Technical paper No. 290, 36 pages. (Price : 8 d.)

1935 621 .13 (02
BELL (A. M.), M. I. Mech. E.
Locomotives : Their construction, maintenance and operation.
London, E. C. 1. Virtue and Co., Ltd., 19-21, Thavies Inn, Holborn Circus. Two volumes. (Price : 37 sh. 6 d. net.)

1935 669 .1
BULLENS (D. K.).
Steel and its heat treatment.
New York. John Wiley & Sons, Inc. London, Chapman and Hall, Ltd. Third edition rewritten. (Price : 25 sh. net.)

1935 385 (.73)
CHAPMAN (J. W.).
Railroad mergers.
New York. Published by Simmons — Boardman Publishing Co. (6 × 9 inches), 157 pages, map showing 21 systems. (Price : $ 3.00.)

1935 625 .1
COUR-PALAIS (Neville H.), Assistant Engineer, Bengal-Nagpur Railway.
Railway points and crossings. Theory and Practice with curve formulæ, and notes on surveying, drawing and setting out permanent way. One vol. (7 1/2 × 5 inches), of 420 pages, with 207 figures and 15 tables 1935, Calcutta : Thacker, Spink & Co. (1933) Ltd. — London : W. Thacker & Co. (Price : 9 Rupees).

1935 62. (0
GEORGE (S. G.) & RETTGER (E. W.).
Mechanics of materials.
London, W. C. 2. McGraw-Hill Publishing Company Ltd., Aldwych House, Aldwych. (Price : 21 sh. net.)

1935 529 (0
Journal of Calendar reform containing a series o papers on calendar reform.
New York. Published by the World Calendar Association, Inc., 485, Madison Avenue.

1935 387. (07 (.42
LONDON SCHOOL OF ECONOMICS AND POLITICA SCIENCE (University of London).
Summary programmes (1935-1936 Session) of lectur and classes on : a) **Railway** and cognate subject b) **Economics, Commerce** (including accounting, bankin and business administration) and **Statistics**; c) **Pol tical Science** (including public administration) a **Sociology** (including psychology). 3 pamphlets of 2 16 and 16 pages respectively.
London W. C. 2, London School of Economics a Political Science, Houghton Street, Aldwych. (Free application.)

1935 621 .133.1 & 621 .
NASH (A. W.) & HOWES (D. A.).
The principles of motor fuel preparation and application.
London. Chapman and Hall, Ltd. Vol. II. (Price 30 sh.)

1935
PATTERSON (E. M.), Ph. D.
Socialism, fascism and democracy.
Philadelphia. The Annuals of the American Academy of Political and Social Science. Vol. 180, July 19 257 pages.

1935 621 .43
SMITH (P. H.).
Diesel engines : Excessive lubricating oil consumption.
London, W. C. 2. Constable and Co., Ltd., 10-12, Orange Street. (Price : 3 sh. 6 d.)

1935 51. (08
THE BRITISH STEELWORK ASSOCIATION.
Section tables, 1934.
London, S. W. 1. Published by the Association, Artillery House. (Price : 3 sh. 6 d. net.)

1935 721 .9
THE INSTITUTION OF STRUCTURAL ENGINEERS.
Report on a standard method for the preparation of calculations relating to steelwork in buildings.
London. Offices of the Institution. (Price : 6 d.)

1935 62. (01
TIMOSHENKO (S.) & McCULLOUGH (G. H.).
Elements of strength of materials.
New York. Published by D. Van Nostrand Co., Inc. (6 × 9 inches), 350 pages, line drawings and tables. (Price : $ 3.25.)

1935 385 (08 (.68)
UNION OF SOUTH AFRICA.
Report of the Railways & Harbours Board for the year ended 31st December 1934.
Cape Town. Cape Times Ltd. 61 pages. (Price : 3 sh. 9 d.)

In Italian.

1935 385. (02
SETTEMBRINI (A.).
Vademecum del ferroviere.
Bologna, Libreria internazionale L. Cappelli. 1 vol., 328 pagine. (Prezzo : L. 5.)

1935 621 .43
TAJANI (F.).
Il motore a combustione interna nella trazione.
Milano, Libreria editrice politecnica. 1 volume, 73 pagine e 16 figure.

[016. 385. (05]

II. — PERIODICALS.

In French.

Annales des ponts et chaussées. (Paris.)

1935 691
Annales des ponts et chaussées, avril, p. 706.
MARTIN (R.). — **Le béton et la construction des grands barrages.** (6 000 mots.)

Annales des travaux publics de Belgique. (Bruxelles.)

1935 624 .2
Annales des travaux publics de Belgique, juin, p. 373.
VIERENDEEL (A.). — **Calcul de fermes-Vierendeel.** (5 200 mots, 2 tableaux & fig.)

Arts et Métiers. (Paris.)

1935 669 .1
Arts et métiers, juillet, p. 147.
Les traitements thermiques des aciers moulés. (2 300 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1935 385 .63
Bull. des transp. intern. par ch. de fer, juillet, p. 250.
Les modifications apportées par la Conférence de Rome aux conditions de responsabilités de la C. I. M. (7 900 mots.) (A suivre.)

1935 313 .385 (.44)
Bull. des transp. intern. par ch. de fer, juillet, p. 297.
Statistique des chemins de fer français. (2 700 mots.)

1935 385 .63
Bull. des transp. intern. par ch. de fer, août, p. 309.
MARK (E.). — **Les modifications apportées par la Conférence de Rome aux conditions de responsabilité de la C. I. M.** (9 400 mots.)

1935 313 .385 (.497.1)
Bull. des transp. intern. par ch. de fer, août, p. 353.
Les chemins de fer du royaume yougoslave pendant l'exercice 1933. (700 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1935 624 (.44) & 621 .392 (.44)
Bull. techn. de la Suisse romande, 20 juillet, p. 169.
STROELE (H. W.). — **Le règlement français sur les ponts et charpentes métalliques soudés.** (2 700 mots.)

Chronique des transports. (Paris.)

1935 621 .43 (.44)
Chronique des transports, 10 juillet, p. 3.
Les autorails des grands réseaux français. (6 000 mots.)

1935 385 .1 (.44)
Chronique des transports, 25 juillet, p. 4.
Les décrets-lois et les chemins de fer. (3 800 mots.)

1935 **385 .113 (.44)**

Chronique des transports, 25 juillet, p. 9.

Les **Grands Réseaux de chemins de fer français** en 1934. (5 000 mots.)

Electricité. (Paris.)

1935 **621 .33 (.44)**

Electricité, juillet, p. 323.

Quelques précisions sur **l'électrification** de la ligne de Paris au Mans. (3 300 mots.)

Génie civil. (Paris.)

1935 **621 .33 (.493)**

Génie civil, N° 2764, 3 août, p. 101.

CALFAS (P.). — **L'électrification** du chemin de fer de Bruxelles à Anvers. (3 000 mots & fig.)

1935 **656 .254 (.44)**

Génie civil, N° 2764, 3 août, p. 113.

Signalisation des passages à niveau munis de barrières oscillantes, en essais sur le réseau P. L. M. (500 mots & fig.)

1935 **625 .62 (.493)**

Génie civil, N° 2765, 10 août, p. 137.

Les moyens de **transport en commun** desservant l'Exposition de Bruxelles. (1 500 mots & fig.)

1935 **621 .43**

Génie civil, N° 2766, 17 août, p. 149.

MERCIER (A.). — **L'autorail** léger et rapide de la Société Ernesto Breda. (4 000 mots & fig.)

1935 **62. (01 & 621 .89**

Génie civil, N° 2766, 17 août, p. 159.

RABATE (H.) & DEVEZ (G.). — L'influence de la finition des surfaces sur leur usure initiale, et l'emploi de **lubrifiants à graphite colloïdal.** (2 200 mots & fig.)

1935 **691**

Génie civil, N° 2767, 24 août, p. 169.

ANSTETT (F.). — **La préparation du béton** en usine pour chantiers multiples. L'usine de béton du quai de Javel, à Paris. (3 800 mots & fig.)

1935 **625 .13 (.73)**

Génie civil, N° 2767, 24 août, p. 182.

Le percement du nouveau **tunnel** du Pennsylvania Railroad, à Baltimore (Etats-Unis). (1 200 mots & fig.)

1935 **624**

Génie civil, N° 2767, 24 août, p. 185.

BUCHWALD (A.). — L'examen des **ponts** au point de vue des manifestations de fatigue, d'après la détermination du « facteur d'élasticité ». (1 500 mots.)

L'Allègement dans les Transports. (Lucerne.)

1935 **625 .2**

L'allègement dans les transports, juillet-août, p. 86.

DUMAS (A.). — **L'aluminium** dans le matériel roulant. (2 100 mots & fig.) (A suivre.)

1935 **621 .335 & 621 .392**

L'allègement dans les transports, juillet-août, p. 91.

KIENSCHERPER (W.). — **Châssis soudés** de locomotives électriques. (1 300 mots, 2 tableaux & fig.)

La Science et la Vie. (Paris.)

1935 **625 .234**

La Science et la Vie, août, p. 89.

VIGNES (M.). — Pas de **chemins de fer** modernes sans climatisation. (5 300 mots & fig.)

1935 **656 .254**

La Science et la Vie, août, p. 117.

CHARMEIL (A.). — Le « **Dispatching** » gardien de la sécurité de nos voies ferrées. (4 300 mots & fig.)

1935 **621 .13 & 625 .2**

La Science et la Vie, septembre, p. 191.

MARCHAND (J.). — Pourquoi les **trains** modernes doivent être **aérodynamiques.** (5 300 mots & fig.)

1935 **625 .4 (.47)**

La Science et la Vie, septembre, p. 251.

GRINAULT (C.). — Comment se construit le **métro** de Moscou. (Métrostroï.) (2 300 mots & fig.)

La Traction électrique. (Paris.)

1934 **625 .5 (.494)**

La Traction Electrique, décembre, p. 204.

HUNZIKER (F.). — **Funiculaire** de Schwyz-Stoos. (4 400 mots & fig.)

1935 **621 .33 (.44)**

La Traction Electrique, mai-juin, p. 35.

L'électrification de la ligne de Paris au Mans. (1 000 mots & fig.)

1935 **621 .33 (.44)**

La Traction Electrique, mai-juin, p. 39.

L'électrification de la ligne de Vierzon à Brive. (1 400 mots.)

1935 **621 .335 (.437)**

La Traction Electrique, mai-juin, p. 41.

HANYK (J.). — Les **locomotives électriques** d'express des Chemins de fer de l'Etat tchécoslovaque, série E 467.0, nos 04 et 05. (1 800 mots & fig.)

1935 **621 .335 (.494)**

La Traction Electrique, mai-juin, p. 45.

PAHIN (A. H.). — Les nouvelles **automotrices** légères électriques des Chemins de fer fédéraux suisses. (1 200 mots & fig.)

1935 **621 .33 (.45)**

La Traction Electrique, mai-juin, p. 47.

PAHIN (A. H.). — La traction électrique en Italie. (1 500 mots.)

1935 **621 .33 (.47)**

La Traction Electrique, mai-juin, p. 49.

L'électrification des chemins de fer russes. (500 mots.)

Les Chemins de fer et les Tramways. (Paris.)

1935 **621 .13 & 625 .2**

Les Chemins de fer et les Tramways, août, p. 201.

Rapport de la Chambre syndicale des fabricants de **matériel pour chemins de fer et tramways.** (8 300 mots.)

1935 **621 .43**

Les Chemins de fer et les Tramways, août, p. 206.

SPIESS (E.). — **Locomotive Diesel** à transmission pneumatique Zarlatti. (6 300 mots & fig.)

1935 **621 .43 & 625 .216**

Les Chemins de fer et les Tramways, août, p. 222.

Tampon aérodynamique pour automotrices rapides. (500 mots & fig.)

1935 **621 .43 (.43)**

Les Chemins de fer et les Tramways, août, p. 223.

Automotrices articulées à très grande vitesse de la Reichsbahn. (800 mots & fig.)

1935 **625 .614**

Les Chemins de fer et les Tramways, août, p. 224.

DESGARDES (E.). — **Etablissement de la voie** pour les chemins de fer coloniaux. (5 000 mots & fig.)

1935 **656 .256.3 (.44)**

Les Chemins de fer et les Tramways, août, p. 227.

Note sur l'emploi du **block-system automatique** sur les chemins de fer français. (2 400 mots.)

Les transports modernes. (Paris.)

1935 **621 .134.3**

Les transports modernes, mars-avril, p. 30.

MADEYSKI (J.). — Nouvelles idées sur la **construction et le service des locomotives à vapeur surchauffées.** (1 400 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1935 **656**

L'Ind. des voies ferrées et des transp. autom., juin, p. 166.

VENTE. — **Chronique de la coordination à l'étranger.** (2 400 mots.)

L'Ingénieur-Constructeur. (Paris.)

1935 **621 .392 & 665 .882**

L'Ingénieur-Constructeur, juillet-août, p. 3518.

LABORDE. — Etat actuel de la technique de **soudure autogène.** (2 300 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1935 **656 .257 (.44)**

Revue générale des chemins de fer, août, p. 77.

VINOT. — La **commande à distance** des bifurcations et zones d'aiguillages, par le système des « Postes semi-autonomes ». (8 500 mots & fig.)

1935 **656 .211 (.44)**

Revue générale des chemins de fer, août, p. 93.

SCHURR & MARCHAND. — **Garages des matériels à voyageurs.** (5 000 mots & fig.)

Revue politique et parlementaire. (Paris.)

1935 **656 (.494)**

Revue politique et parlementaire, 10 juillet, p. 36.

PESCHAUD (M.). — La **coordination des transports** de marchandises en Suisse et le referendum du 5 mai 1935. (5 500 mots.)

Revue universelle des mines. (Liége.)

1935 **621 .392**

Revue universelle des mines, août, p. 345.

MORESSEE (G.). — La **soudure électrique.** (8 300 mots & fig.)

1935 **621 .87**

Revue universelle des mines, août, p. 362.

LEJEUNE (H.). — L'horizontalité de la trajectoire de la charge dans les **grues** à flèche relevable. (1 200 mots & fig.)

In German.

Die Lokomotive. (Wien.)

1935 **621 .132.5 (.73)**

Die Lokomotive, Juli, S. 117.

Auf dem Wege zur **amerikanischen Universaltype : 2 D 2 Lokomotive** der Chicago- & Nordwestbahn. (2 300 Wörter & Abb.)

1935 **313 .385 (.436)**

Die Lokomotive, Juli, S. 125.

SCHÖPFER (A.). — Die **Bilanz** der Oesterreichischen Bundesbahnen über das Jahr 1934. (3 300 Wörter.)

Elektrische Bahnen. (Berlin.)

1935 **385.** (09.3 (.43)

Elektrische Bahnen, Juli, S. 169.

EMRICH. — Zur Eröffnung der Ausstellung « 100 **Jahre deutsche Eisenbahnen** ». (1 600 Wörter & Abb.)

1935 **621 .335** (.43)

Elektrische Bahnen, Juli, S. 172.

BREUER (M.) & LICHTENFELD. — Neue **Triebwagen** für die Berliner S.-Bahn, Probezüge 1934/35. (8 900 Wörter & Abb.)

1935 **621 .332**

Elektrische Bahnen, Juli, S. 187.

WEICKER (W.). — Zur Frage der Isolierung von **Vollbahn-Fahrleitungen.** (1 600 Wörter & Abb.)

1935 **621 .335** (.43)

Elektrische Bahnen, Juli, S. 190.

FÖRSTNER. — Der Einheits-**Wechselstromtriebwagen** der Deutschen Reichsbahn. (11 500 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1935 **621 .132.8** (.73)

Glasers Annalen, Heft 1, 1. Juli, S. 1.

THEOBALD (W.). — Neuere Amerikanische **Gelenklokomotiven.** (1 800 Wörter & Abb.)

1935 **385 .113** (.43)

Glasers Annalen, Heft 1, 1. Juli, S. 3.

Aus dem **Geschäftsbericht** der Deutschen Reichsbahn-Gesellschaft über das 10. Geschäftsjahr. (5 500 Wörter & Abb.)

1935 **621 .138** (.489)

Glasers Annalen, Heft 2, 15 Juli, S. 11.

Die neue **Lokomotivbehandlungsanlage** auf dem Bahnhof Fredericia (Dänemark). (1 100 Wörter & Abb.)

1935 **621 .135.4**

Glasers Annalen, Heft 2, 15 Juli, S. 13; Heft 3, 1 August, S. 19.

KINKELDEI (L.). — Kurveneinstellung, Führungsdrücke und Kurvenwiderstand von **Lokomotiven mit Bisselachsen,** nach dem Druckrollenverfahren berechnet. (9 500 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1935 **625 .113**

Organ für die Fortschr. des Eisenbahnwesens, Heft 13, 1. Juli, S. 225.

BESSAGA MIECZYSLAW. — Beitrag zur Frage der **Bogenberichtigung.** (1 600 Wörter.)

1935 **625 .14** (01

Organ für die Fortschr. des Eisenbahnwesens, Heft 13, 1. Juli, S. 228.

KOCH (H. W.). — Neuere Schwingungsuntersuchungen am **Eisenbahnoberbau.** (3 300 Wörter & Abb.)

1935 **625 .143.2**

Organ für die Fortschr. des Eisenbahnwesens, Heft 13, 1. Juli, S. 232.

BERCHTENBREITER. — **Zur Baustoffrage hochwertiger Schienen.** (2 700 Wörter.)

1935 **625 .144.1**

Organ für die Fortschr. des Eisenbahnwesens, Heft 13, 1. Juli, S. 235.

LEDERLE (H.). — **Sicherheit** gegen Verwerfung im durchgehend geschweissten Gleise. (2 000 Wörter & Abb.)

1935 **621 .33** (.43)

Organ für die Fortschr. des Eisenbahnwesens, Heft 14, 15. Juli, S. 245.

TETZLAFF (H.). — **Elektrisierung** der deutschen Reichsbahnstrecke Halle-Magdeburg. (3 300 Wörter & Abb.)

1935 **621 .33** (.436)

Organ für die Fortschr. des Eisenbahnwesens, Heft 14, 15. Juli, S. 250.

KAAN (E. R.). — Die **Elektrisierung** der Tauernbahn. (1 900 Wörter & Abb.)

1935 **621 .33** (.439)

Organ für die Fortschr. des Eisenbahnwesens, Heft 14, 15. Juli, S. 253.

VON LANER (K.). — Die **Elektrifizierung** der Hauptstrecke Budapest-Hegyeshalom der Kgl. Ungarischen Staatsbahnen. (1 500 Wörter & Abb.)

1935 **621 .33** (.492)

Organ für die Fortschr. des Eisenbahnwesens, Heft 14, 15. Juli, S. 255.

VAN LESSEN. — **Elektrisierungen** in Holland. (1 400 Wörter & Abb.)

1935 **385.** (06.4(.43)

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 264.

Überblick über die **Jubiläumsschau** der Deutschen Reichsbahn. (4 300 Wörter & Abb.)

1935 **621 .132.1** (.43)

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 271.

WAGNER (R. P.). — Die **Dampflokomotiven** und **Motorkleinlokomotiven.** (8 500 Wörter & Abb.)

1935 **621 .132.8** (.43) & **621 .43** (.43)

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 281.

GRAFFL (R.). — 1 400 **P. S. Diesellokomotive** mit **Flüssigkeitsgetriebe.** (1 400 Wörter & Abb.)

1935 **625 .23** (.43)

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 283.

DAHNICK. — **Personenwagen.** (8 700 Wörter & Abb.)

1935 **621 .43 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 295.

BREUER (M.). — **Triebwagen** für den Schnellverkehr mit eigener Kraftquelle. (2 400 Wörter & Abb.)

1935 **621 .43 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 298.

GRAFFL (R.). — Zweiachsige **Triebwagen** für den Nahverkehr. (1 400 Wörter & Abb.)

1935 **621 .335 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 301.

GANZENMÜLLER. — Die **elektrischen Triebfahrzeuge.** (3 900 Wörter & Abb.)

1935 **625 .24 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 306.

LUTHER, KÖPKE & TASCHINGER. — **Güterwagen.** (3 900 Wörter & Abb.)

1935 **625 .245 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 311.

TASCHINGER. — Der 75 t.-**Kranwagen** der Deutschen Reichsbahn. (1 000 Wörter & Abb.)

1935 **625 .25 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 313.

RECKEL. — Die bremstechnischen Neuerungen auf der **Jahrhundert-Ausstellung** in Nürnberg. (1 900 Wörter & Abb.).

1935 **625 .14 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 317.

FEIL. — Der Oberbau in der **Jahrhundert-Ausstellung.** (2 800 Wörter & Abb.)

1935 **656 .25 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1 August, S. 321.

KRAPP. — Das **Eisenbahnsicherungswesen.** (4 700 Wörter & Abb.)

1935 **656 .254 (.43)**

Organ für die Fortschritte des Eisenbahnwesens, Heft 15-16, 1. August, S. 328.

KIDERLIN. — Das **Fernmeldewesen.** (2 400 Wörter & Abb.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1935 **656 .225 (.43) & 656 .261 (.43)**

Zeitschrift des Vereines deutscher Ingenieure, Nr. 27, 6. Juli, S. 845.

HEIN (P.). — **Ladeschwinge** für Grossbehälter. (1 000 Wörter & Abb.)

1935 **621 .131.2, 625 .2 & 656 .221**

Zeitschrift des Vereines deutscher Ingenieure, Nr. 28, 13. Juli, S. 851.

VOGELPOHL (G.). — Die physikalische Natur der **Bewegungswiderstände** von Eisenbahnfahrzeugen. (8 000 Wörter & Abb.)

1935 **385. (07.4(.43)**

Zeitschrift des Vereines deutscher Ingenieure, Nr. 28, 13. Juli, S. 861.

DERSCH (G.). — 100 Jahre deutsche Eisenbahn. Die **Ausstellung** in Nürnberg. (2 000 Wörter & Abb.)

1935 **621 .88**

Zeitschrift des Vereines deutscher Ingenieure, Nr. 30, 27. Juli, S. 917.

THUM (A.) & DEBUS (F.). — Die Vorzüge der **Dehnschraube.** (2 300 Wörter & Abb.)

1935 **691**

Zeitschrift des Vereines deutscher Ingenieure, Nr. 30, 27. Juli, S. 920.

NERNST (L.). — **Kadmium** als Rostschutzmittel. (3 300 Wörter.)

1935 **385 (.43)**

Zeitschr. des Vereines deutscher Ingenieure, Nr. 31, 3. August, S. 945.

OLTERSDORF (F.). — **Eisenbahnfragen** in Verbindung mit der Rückkehr des Saarlandes zum Reich. (5 500 Wörter & Abb.)

1935 **62. (01**

Zeitschr. des Vereines deutscher Ingenieure, Nr. 33. 17. August, S. 1005.

LEHR (E.) & MAILANDER (R.). — Einfluss von **Hohlkehlen** an abgesetzten Wellen auf die Biegewechselfestigkeit. (3 900 Wörter, 5 Tafeln & Abb.)

1935 **536**

Zeitschr. des Vereines deutscher Ingenieure, Nr. 34. 24. August, S. 1041.

LUTZ (O.). — Zeichnerische Ermittlung der Wandtemperaturen beim Wärmedurchgang durch **Wände von beliebiger Form.** (2 800 Wörter & Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

1935 **656 .254 (.43)**

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 10, 1. August, S. 120.

LÜTGERT. — Die selbsttätigen Warnanlagen an **Wegübergängen** bei der Deutschen Reichsbahn. (1 500 Wörter & Abb.)

1935 **656 .25 (.42)**

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 11, 20. August, S. 125.

LASCELLES (T. S.). — Neuere Fortschritte im englischen **Eisenbahn-Signalwesen.** (2 900 Wörter & Abb.)

1935 **656 .152**
Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 11, 20. August, S. 134.
BUDDENBERG. — Die **Reichsbahnschranke.** (1 000 Wörter & Abb.)

Zeitung des Vereins mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1935 **625 .232**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 30, 25. Juli, S. 637.
KORHAMMER. — **Fahrbare Waschwagen** für Züge mit Massen-transporten. (900 Wörter & Abb.)

1935 **385. (09(.593)**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 30, 25. Juli, S. 639.
Die **Eisenbahnen** von Siam. (1 900 Wörter.)

1935 **385. (09.3(.436)**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 32, 8. August, S. 663.
FEILER (K.). — **Fünfundsiebzig Jahre Kaiserin Elisabeth-Bahn.** (1 500 Wörter & Abb.)

1935 **656 .223.2**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 32, 8. August, S. 666.
EGER. — Nachprüfbarkeit der **Verwendung des Frachtgutes** im nationalen und internationalen Verkehr. (1 200 Wörter.)

1935 **725 .32 (.43)**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 32, 8. August, S. 672.
JÜSGEN. — Die neue **Güterabfertigung** Köln-Gereon. (500 Wörter & Abb.)

1935 **621 .138.2**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 33, 15. August, S. 685.
VELTE. — **Brennstoffwirtschaft** bei **Dampflokomotiven** auf praktisch wissenschaftlicher Grundlage. (2 800 Wörter & Abb.) (Schluss folgt.)

1935 **385 .1 (.436)**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 33, 15. August, S. 693.
Die **finanzielle Entwicklung** der Österreichischen Bundesbahnen. (2 300 Wörter.)

In English.

Brotherhood of Locomotive Firemen and Enginemen's Magazine. (Cleveland, Ohio.)

1935 **621 .132.8 (.73)**
Brotherhood of Loc. Firemen and Enginemen's Magazine, June, p. 368.
The « Milwaukee » type **streamlined steam locomotive.** (1 500 words & fig.)

Engineer. (London.)

1935 **621 .392 (.73) & 625 .143.4 (.73)**
Engineer, No. 4143, June 7, p. 585.
Rail welding on American Railways. (2 400 words & fig.)

1935 **621 .3 (06(.42)**
Engineer, No. 4143, June 7, p. 591.
The National Electrical Convention. (3 000 words.) (To be continued.)

1935 **621 .392 & 625 .144.1**
Engineer, No. 4143, June 7, p. 595.
The welding of rails. (1 400 words.)

1935 **621 .392, 665 .882 & 669 .1**
Engineer, No. 4143, June 7, p. 599; No. 4144, June 14, p. 613.
Symposium on the welding of iron and steel. (12 400 words.)

1935 **621 .33 (.42)**
Engineer, No. 4144, June 14, p. 621.
Suburban railway electrification. (2 600 words.)

1935 **621 .392 (06(.42)**
Engineer, No. 4144, June 14, p. 625.
The National Electrical Convention. (6 600 words.)

1935 **656 .212 (.42), 656 .225 (.42) & 656 .26 (.42)**
Engineer, No. 4144, June 14, p. 629.
The Mechanical handling of freight traffic. (700 words.)

1935 **656 .221**
Engineer, No. 4145, June 21, p. 640.
MARSHALL (C. F. D.). — **Train resistance** in India. (2 200 words & fig.)

1935 **621 .33 (.42)**
Engineer, No. 4146, June 28, p. 664.
Southern Railway electrified extension. (3 300 words & fig.)

1935 **621 .132.5 (.42)**
Engineer, No. 4146, June 28, p. 678.
New L. M. S. freight engine. (400 words & fig.)

1935 **656 .281 (.42)**
Engineer, No. 4147, July 5, p. 5.
Three locomotive derailments. (2 400 words.)

1935 **656 .211.7 (.42) & 699 .42)**
Engineer, No. 4147, July 5, p. 6.
L. N. E. R. oil-electric paddle vessel « Talisman ». (1 800 words & fig.)

1935 **621 .132.3 (.42) & 621 .132.8 (.42)**
Engineer, No. 4147, July 5, p. 14.
The L. M. S. **turbine locomotive.** (1 300 words & fig.)

1935 **62. (01 & 669**
Engineer, No. 4147, July 5, p. 21.
BURN (W. S.). — **The relation of fatigue to modern engine design.** (2 500 words & fig.) (To be continued.)

1935 **656 .222.1 (.42)**
Engineer, No. 4148, July 12, p. 37.
High-speed test run of L. M. S. locomotive. (1 600 words & 1 table.)

1935 **621 .94 (.42)**
Engineer, No. 4148, July 12, p. 38.
A small vertical milling machine. (750 words & fig.)

1935 **656 .254**
Engineer, No. 4148, July 12, p. 41.
Automatic train control and track circuit. (2 200 words.)

1935 **621 .33 (.42)**
Engineer, No. 4148, July 12, p. 41.
Electrification on the Southern Railway. (1 400 words.)

1935 **669 .2**
Engineer, No. 4148, July 12, p. 44.
Tungum alloy. (400 words & tables.)

1935 **62. (01 & 669**
Engineer, No. 4148, July 12, p. 48.
The relation of fatigue to modern engine design. — Abstract of part II of a paper written under this title by R. A. MacGREGOR, W. S. BURN & F. BACON. (3 600 words & fig.)

1935 **51. (08**
Engineer, No. 4149, July 19, p. 56; No. 4150, July 26, p. 82.
The differential analyser. (7 300 words & fig.)

1935 **621 .95**
Engineer, No. 4149, July 19, p. 59.
Drilling copper tube plates. (1 500 words, 5 tables & fig.)

1935 **621 .132.3 (.42)**
Engineer, No. 4149, July 19, p. 74.
L. M. S. **four-cylinder passenger locomotives.** (500 words & fig.)

1935 **62. (01**
Engineer, No. 4149, July 19, p. 74.
A sensitive vibration recorder. (250 words & fig.)

1935 **621 .135 (01**
Engineer, No. 4150, July 26, p. 84.
BAXTER (F. L.). — **Balancing of three-cylinder locomotives.** (2 800 words, 8 tables & fig.)

1935 **621 .33 (.439)**
Engineer, No. 4150, July 26, p. 86.
Electrification on the Hungarian State Rys. (600 words & fig.)

1935 **656 .28 (01 (.42)**
Engineer, No. 4150, July 26, p. 90.
The annual railway accident report. (900 words.)

1935 **656 .212.6 (.73)**
Engineer, No. 4150, July 26, p. 97.
280-ton travelling pneumatic grain discharging plant. (1 900 words & fig.)

1935 **621 .335 (.54) & 621 .43 (.54)**
Engineer, No. 4150, July 26, p. 98.
Oil electric locomotives for India. (900 words & fig.)

1935 **669 .1**
Engineer, No. 4150, July 26, p. 100.
SWINDEN (T.) & BOLSOVER (G. R.). — Some notes on **ingot moulds.** (6 000 words, 3 tables & fig.)

Engineering. (London.)

1935 **621 .392, 665 .882 & 669 .1**
Engineering, No. 3621, June 7, p. 606.
The welding of iron and steel. — Specification, inspection, testing and safety aspects of welding. (2 400 words.)

1935 **621 .3 (06(.42)**
Engineering, No. 3621, June 7, p. 607.
The First National Electrical Convention. (1 900 words. (To be continued.)

1935 **621 .392 (.42) & 625 .242 (.42)**
Engineering, No. 3621, June 7, p. 609.
Welded coal wagons for the London & North Eastern Railway. (300 words & fig.)

1935 **62. (01 & 669 .1**
Engineering, No. 3621, June 7, p. 611.
HANKINS (G. A.) & MILLS (H. R.). — **The resistance of spring steels to repeated impact stresses.** (2 000 words, 3 tables & fig.)

1935 **62. (01 & 69**
Engineering, No. 3622, June 14, p. 618.
CRESKOFF (J. J.). — **The period of vibration as an index of structural integrity.** (1 800 words & fig.)

1935 **621 .8 & 621 .43**
Engineering, No. 3622, June 14, p. 624.
HAWORTH (H. F.) & RYSHOLM (A.). — **Progress in design.** (2 400 words & fig.)

1935 **621 .33 (.42)**
Engineering, No. 3622, June 14, p. 629.
Railway electrification in the London Area. (1 900 words.)

1935 **656 .211.7 (.42) & 699 (.42)**
Engineering, No. 3623, June 21, p. 650.
Cross-Channel motorship « Queen of the Channel ». (1 000 words & fig.)

1935 **62. (01 & 669**
Engineering, No. 3623, June 21, p. 660.
AMSLER universal **cupping-test machine.** (600 words & fig.)

1935 **621 .392 & 665 .882**
Engineering, No. 3623, June 21, p. 662.
Specification, inspection, testing and safety aspects of welding. A brief summary of papers presented in Group 4 of the Symposium on the Welding of Iron and Steel, held in London on May 2 and 3 and organised by the Iron and Steel Institute in cooperation with other technical societies. (1 500 words.)

1935 **531**
Engineering, No. 3624, June 28, p. 672.
GRAY (R. H.). — **The determination of flywheel effect.** (600 words & fig.)

1935 **621 .132.5 (.42)**
Engineering, No. 3624, June 28, p. 689.
2-8-0 type locomotives for the London Midland & Scottish Railway. (400 words & fig.)

1935 **669 .1**
Engineering, No. 3624, June 28, p. 691.
WITHELEY (J. H.). — **An effect of oxygen and sulphur on iron in scaling.** (6 500 words, 1 table & fig.)

1935 **625 .4 (.42) & 656 .211 (.42)**
Engineering, No. 3625, July 5, p. 3.
The reconstruction of Leicester Square Station, London. (2 000 words & fig.)

1935 **669 .3**
Engineering, No. 3625, July 5, p. 9.
Tungum alloy. (700 words.)

1935 **621 .132.3 (.42) & 621 .132.8 (.42)**
Engineering, No. 3625, July 5, p. 10.
4-6-2 type turbine locomotive, L. M. S. Ry. (1 400 words & fig.)

1935 **621 .89**
Engineering, No. 3625, July 5, p. 15.
The boundary friction of oxidised oil. (1 300 words.)

1935 **621 .33 (.42)**
Engineering, No. 3625, July 5, p. 23.
The electrification of the Southern Railway to Eastbourne and Hastings. (3 300 words & fig.)

1935 **656 .222.1 (.42)**
Engineering, No. 3626, July 12, p. 34.
Test runs of L. M. S. locomotive « The Princess Royal ». (1 000 words.)

1935 **621 .94 (.42)**
Engineering, No. 3626, July 12, p. 46.
Electrically-driven vertical milling machine. (1 200 words & fig.)

Engineering News-Record. (New York.)

1935 **624 .51 (.73)**
Engineering News-Record, No. 25, June 20, p. 865.
Batter-Leg towers for San Francisco Bay bridge. (1 500 words & fig.)

1935 **624 .51 (.73)**
Engineering News-Record, No. 25, June 20, p. 867.
HUNTER (H. C.). — Hammerhead derricks erect **steel towers** of Bay bridge. (3 000 words & fig.)

1935 **62. (01, 694 & 721 .7**
Engineering News-Record, No. 25, June 20, p. 871.
Tests indicate design methods for **earthquake-proof timber floors.** (3 500 words & fig.)

1935 **385 (09(.73) & 625 .1 (.73)**
Engineering News-Record, No. 26, June 27, p. 917.
STEVENS (J. F.). — An engineer's recollections. — VIII. — **The railway invasion of Central Oregon.** (2 300 words & fig.)

1935 **62. (01(.06(.73)**
Engineering News-Record, No. 1, July 4, p. 20.
Materials research and standardization increasingly active. (Detroit meeting of A. S. T. M.) (5 000 words.)

1935 **621 .39 & 691**
Engineering News-Record, No. 1, July 4, p. 52.
WUERPEL (Ch. E.). — **Moisture in concrete sand measured by electric current.** (2 200 words & fig.)

1935 **62. (01(06(.73)**
Engineering News-Record, No. 1, July 4, p. 55.
Cement, timber, brick and asphalt specifications and tees. (Second half of A. S. T. M. convention at Detroit.) (5 600 words & fig.)

Journal of Applied Mechanics, A. S. M. E. (New York.)

1935 **531 & 621**
Journal of Applied Mechanics, A. S. M. E., June, p. A-41.
BIOT (M. A.). — **Distributed gravity and temperature loading in two-dimensional elasticity replaced by boundary pressures and dislocations.** (2 500 words & fig.)

1935 **531 & 621**
Journal of Applied Mechanics, A. S. M. E., June, p. A-46.
DEN HARTOG (J. P.) & McGIVERN (J. G.). — **On the hydrodynamic analogy of torsion.** (2 500 words & fig.)

1935 **62. (01, 621 .83 & 669 .1**
Journal of Applied Mechanics, A. S. M. E., June, p. A-49.
WAY (S.). — **Pitting due to rolling contact.** (6 500 words & fig.)

1935 **621 .82 & 621 .89**
Journal of Applied Mechanics, A. S. M. E., June, p. A-59.
STONE (M.). — **Film, lubrication in sleeve bearings.** (2 300 words & fig.)

1935 **62. (01 & 621 .82**
Journal of Applied Mechanics, A. S. M. E., June, p. A-69.
Fatigue of shafts at fitted members, with a related photoelastic analysis. (3 800 words, tables & fig.)

Journal, Institution of Engineers, Australia. (Sydney, N. S. W.)

1935 **693**
Journal, Institution of Engineers, Australia, May, p. 168.
JAMIESON (L. N.). — **The effects of composition on the strength of concretes.** (5 800 words, 2 tables & fig.)

1935 **62. (01 & 624. (0**
Journal, Institution of Engineers, Australia, May, p. 187.
DOAK (W. J.). — **Timber railway bridges and the life of timber.** (3 200 words, table & fig.)

Journal, Institute of Transport. (London.)

1935 **656**
Journal, Institute of Transport, July, p. 343.
RADFORD (A.). — **Economic theory and transport co-ordination.** (6 000 words.)

1935 **656 (.436)**
Journal, Institute of Transport, p. 349.
STRAUSS (F.). — **Transportation in Austria** (4 700 words & fig.)

Mechanical Engineering. (New York.)

1935 **621 .18, 621 .2 & 621 .3**
Mechanical Engineering, July, p. 403.
GILBERT (E. M.). — **Steam versus hydro power.** (3 200 words & fig.)

1935 **621 .4**
Mechanical Engineering, July, p. 407.
KARMAN (Th. von). — **Some aspects of the turbulence problem.** (5 600 words & fig.)

1935 **621 .82 & 669**
Mechanical Engineering, July, p. 413.
GILL (A. H.). — **Are metals permeable by oil?** Experiment shows that leaded bronze and babbitt metal absorb oil. (1 200 words, 1 table & fig.)

1935 **62. (01 & 669 .1**
Mechanical Engineering, July, p. 423.
ZIMMERMAN (J. H.). — **Cutting structural steel.** (2 400 words, 4 tables & fig.)

1935 **669 .1**
Mechanical Engineering, July, p. 429.
McELWEE (R. G.). — **Modern cast iron.** (2 600 words.)

Modern Transport. (London.)

1935 **656 (.73)**
Modern Transport, No. 848, June 15, p. 3.
Main line trains, tube trains, local tramcars and buses accommodated in one building. (1 300 words & fig.)

1935 **656 .254 & 656 .29**
Modern Transport, No. 848, June 15, p. 5.
Dealing with railway breakdowns. **Methods of traffic working.** (1 500 words.)

1935 **621 .33 (.43)**
Modern Transport, No. 848, June 15, p. 7.
Railway electrification in Germany. The Augsburg-Nürnberg line. (1 000 words & fig.)

1935 **347 .763 & 656**
Modern Transport, No. 849, June 22, p. 3.
MANCE (Sir H. O.). — **Control of transport.** Possible future developments in the road-rail controversy. (1 500 words.)

1935 **656 .253 (.493)**
Modern Transport, No. 849, June 22, p. 5.
New signalling at Brussels North Station meeting the requirements of a complicated layout. (1 900 words & fig.)

1935 **621 .43 (.82)**
Modern Transport, No. 849, June 22, p. 7.
New rubber-tyred railcar. Noble guide wheel system for Entre Rios Railways. (1 000 words & fig.)

1935 **621 .132.5 (.42)**
Modern Transport, No. 849, June 22, p. 9.
Two cylinder superheated locomotives for L. M. S. Ry. (800 words & fig.)

1935 **621 .132.8 (.42)**
Modern Transport, No. 850, June 29, p. 7.
L. M. S. introduces 4-6-2 « turbomotive ». (2 000 words & fig.)

1935 **38 (06 & 656 (06**
Modern Transport, No. 851, July 6, p. 3.
Thirty-nine nations discuss transport. (3 000 words.)

1935 **656 .222.1 (.42)**
Modern Transport, No. 851, July 6, p. 4
High-speed test run on the L. M. S. Ry. — 453 tons hauled 152 miles at 70.7 m. p. h. (2 000 words & 1 table.)

1935 **621 .43 (.41)**
Modern Transport, No. 851, July 6, p. 5.
Oil-engined railcars in Ireland. (500 words & fig.)

1935 **621 .132.8 (.43) & 625 .23 (0(.43)**
Modern Transport, No. 851, July 6, p. 7.
New German high-speed trains. (800 words & fig.)

1935 **656 .258 (.42)**
Modern Transport, No. 852, July 13, p. 3.
Power signalling at Manchester Central Station. (1 800 words & fig.)

1935 **38 (06 & 656 (06**
Modern Transport, No. 852, July 13, p. 5.
Road-rail problem. — International resolution. (International Chamber of Commerce.) (1 200 words.)

1935 **625 .232 (.42)**
Modern Transport, No. 852, July 13, p. 5.
Steel-covered corridor trains for the G. W. R. (800 words & fig.)

1935 **625 .232 (.44)**
Modern Transport, No. 852, July 13, p. 6.
Lightweight rolling stock in France. — Articulated train-set for Nord Railway. (800 words & fig.)

1935 **625 .215**
Modern Transport, No. 852, July 13, p. 7.
BUCHLI (J.). — **Improved running of railway coaches.** — The « Duplex » bogie. (800 words & fig.)

1935 **625 .244 (.42)**
Modern Transport, No. 852, July 13, p. 8.
L. M. S. Ry. insulated vans. — Incorporating new ideas. (600 words.)

1935 **624 .32 (.54)**
Modern Transport, No. 853, July 20, p. 3.
New **railway bridge** over the Nerbudda River. (1 600 words & fig.)

1935 **621 .132.3 (.42)**
Modern Transport, No. 853, July 20, p. 7.
New 4-6-2 four-cylinder passenger locomotives L.M.S. Ry. (1 800 words & fig.)

1935 **621 .132.7 (.436) & 621 .133.8 (.436)**
Modern Transport, No. 853, July 20, p. 8.
A check on shunting. — Recording apparatus on engines. (800 words & fig.)

Railway Gazette. (London.)

1935 **625 .234**
Railway Gazette, No. 1, July 5, p. 13.
MIALL (S.). — **Air conditioning of trains — IV.** (2 000 words & fig.)

1935 **625 .17**
Railway Gazette, No. 1, July 5, p. 15.
Railway maintenance problems, VII. — Ancillary works. (1 400 words & fig.)

1935 **656 .1**
Railway Gazette, No. 1, July 5, p. 19.
The road train. (1 500 words & fig.)

1935 **656 .261 (.42)**
Railway Gazette, No. 1, July 5, p. 21.
WILSON (A. R.). — Dealing with **outsize loads.** (900 words & fig.)

1935 **621 .132.8 (.65)**
Railway Gazette, No. 1, July 5, p. 27.
Beyer-Garratt locomotives in Algeria. (1 200 words & fig.)

1935 **621 .9 (.42)**
Railway Gazette, No. 1, July 5, p. 29.
Machining locomotive cylinders. — Details of a new machine recently installed for this operation at the Derby works of the L. M. S. Ry. (500 words & fig.)

1935 **656 .222.3 (.42)**
Railway Gazette, No. 2, July 12, p. 52.
Would it pay to abolish first class ? (2 700 words & fig.)

1935 **625 .143.3**
Railway Gazette, No. 2, July 12, p. 56.
The wear of steel rails. (1 200 words.)

1935 **62. (01(.54) & 624 .2 (.54)**
Railway Gazette, No. 2, July 12, p. 57.
Recent practice in **testing of bridges in India.** (2 700 words & fig.)

1935 **625 .143.3**
Railway Gazette, No. 3, July 19, p. 97.
Wear of rails. (800 words.)

1935 **385. (09.1(.54)**
Railway Gazette, No. 3, July 19, p. 104.
ARTHURTON (A. W.). — Impressions of overseas transport. — XIII. **The Ceylon Government Railways.** (1 200 words.)

1935 **656 .225 (.42) & 656 .261 (.42)**
Railway Gazette, No. 3, July 19, p. 105.
Station truck working on the G. W. Ry. (1 200 words & fig.)

1935 **313 : 656 .23 (.42)**
Railway Gazette, No. 3, July 19, p. 107.
Passenger traffic statistics 1923-1934. (1 500 words & fig.)

1935 **625 .232 (.73)**
Railway Gazette, No. 3, July 19, p. 110.
New coaches and buffet cars, G. N. Ry. (Ireland) (600 words & fig.)

1935 **656 .211.7 (.42)**
Railway Gazette, No. 3, July 19, p. 111.
Southern Railway and the naval review. (1 300 words & fig.)

1935 **621 .132.3 (.42)**
Railway Gazette, No. 3, July 19, p. 113.
New 4-6-2 express locomotives, L. M. S. Ry. (600 words & fig.)

1935 **621 .138.5 (.42) & 621 .9 (.42)**
Railway Gazette, No. 3, July 19, p. 116.
Improvements at Doncaster works, L.N.E. Ry. — III. (1 000 words & fig.)

1935 **621 .133.5 (.54)**
Railway Gazette, No. 3, July 19, p. 118.
Locomotive blast-pipe trials in India. (500 words & fig.)

1935 **621 .8 (.43) & 621 .43 (.43)**
Diesel Ry. Traction, p. 78, Supplt. to Ry. Gazette, July 12.
Another German **hydraulic transmission.** (1 100 words & fig.)

1935 **621 .43**
Diesel Ry. Traction, p. 79, Supplt. to Ry. Gazette, July 12.
The maintenance of fuel tanks and filters. (1 400 words & fig.)

1935 **621 .43 (.45) & 625 .3 (.45)**
Diesel Ry. Traction, p. 81, Supplt. to Ry. Gazette, July 12.
Diesel railcars for mixed rack and adhesion working. (600 words & fig.)

1935 **621 .43 (.44)**
Diesel Ry. Traction, p. 82, Supplt. to Ry. Gazette, July 12.
Express diesel railcars on the P. O.-Midi Ry. (850 words, tables & fig.)

1935 **621 .43 (.42)**
Diesel Ry. Traction, p. 86, Supplt. to Ry. Gazette, July 12.
SHORT (L. H.). — Service operation of an L. M. S. Ry. **diesel shunter.** (500 words, 1 table & fig.)

1935 **621 .43 (.42)**
Diesel Ry. Traction, p. 87, Supplt. to Ry. Gazette, July 12.
More French cars with **electro-mechanical transmission.** (Fig.)

1935 **621 .8 & 621 .43**
Diesel Ry. Traction, p. 89, Supplt. to Ry. Gazette, July 12.
LEHEL (V.). — Efficiency tests of **mechanical transmission.** (2 300 words & fig.)

Railway Magazine. (London.)

1935 **656 .222.1 (.42)**
Railway Magazine, July, p. 1.
ALLEN (C. J.). — **British locomotive practice and performance.** — Three-hundreth article. (5 400 words & tables.)

1935 **385. (09(.43)**
Railway Magazine, July, p. 21.
ELLIS (H.). — **The German Railways** 1835-1935 (Part 1). (3 200 words & fig.)

Proceedings, American Society of Civil Engineers. (New York.)

1935 **62. (01**
Proceed., Amer. Soc. of Civil Engineers, May, p. 597.
SMITS (H. G.). — **Photo-elastic determination of shrinkage stresses.** (1 700 words & fig.)

1935 **624 .2**
Proceed., Amer. Soc. of Civil Engineers, May, p. 605.
COMPTON (H. B.) & DOHRENWEND (C. O.). — **The shear-area method.** (3 000 words & fig.)

1935 **721 .1**
Proceed., Amer. Soc. of Civil Engineers, May, p. 623.
BAUMANN (P.). — Discussion on analysis of **sheet-pile bulkheads.** (Paper published in March 1934, Proceedings). (4 000 words, 8 tables & fig.)

1935 **624 .6**
Proceed., Amer. Soc. of Civil Engineers, May, p. 642.
WILSON (W. M.). — **Laboratory tests of multiple arch-span reinforced concrete arch bridges.** — Discussion on paper published in April 1934 Proceedings. (2 000 words.)

1935 **72 .9**
Proceed., Amer. Soc. of Civil Engineers, May, p. 646.
TSAI (F. Y.), ALBERT (O.) & DUBIN (E. A.). — **Eccentric riveted connections.** — Discussion on paper published in August 1934 Proceedings. (4 500 words.)

Proceedings, Institution of Mechanical Engineers. (London.)

1934 **621 .43**
Proceed., Institut. of Mech. Engineers, December, p. 123.
ALCOCK (J. F.). — **Air swirl in oil engines.** (Paper and discussion.) (20 000 words & fig.)

1934 **69 & 721**
Proceed., Institut. of Mech. Engineers, December, p. 195.
ALLOUT (E. A.). — **Heat insulation** as applied to buildings and structures. (Paper and discussion.) (16 000 words & fig.)

1934 **62. (01, 621 .8 & 669**
Proceed., Institut. of Mech. Engineers, December, p. 253.
GOUGH (H. J.), COX (H. L.) & SOPWITH (D. G.). — **Design of crane hooks and other components of lifting gear.** (Paper with written discussion.) (30 000 words & fig.)

The Locomotive. (London.)

1935 **621 .132.8 (.42)**

The Locomotive, July 15, p. 202.

4-6-2 turbine express locomotive, L. M. S. Ry. (1 900 words & fig.)

1935 **621 .132.5 (.42)**

The Locomotive, July 15, p. 206.

2-8-0 freight locomotives, L. M. S. Ry. (1 000 words & fig.)

1935 **621 .33 (.42)**

The Locomotive, July 15, p. 209.

Electrification extension to Eastbourne and Hastings, Southern Ry. (1 200 words & fig.)

1935 **621 .43 (.42)**

The Locomotive, July 15, p. 212.

Two-car Diesel train, Great Northern Ry. (Ireland). (500 words & fig.)

1935 **656 .224**

The Locomotive, July 15, p. 215.

FELLOWS (R. B.). — The evolution of the **slip coach.** (3 200 words & fig.)

1935 **621 .135.4**

The Locomotive, July 15, p. 220.

ELL (S. O.). — **Locomotive axle side play.** (1 600 words & fig.)

1935 **621 .133.7**

The Locomotive, July 15, p. 228.

Heinl hot water feed system for locomotives. (3 000 words & fig.)

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1935 **621 .392**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., Julio, p. 372.

ECHEVARRIA REZOLA (R. de). — Notas sobre **soldadura eléctrica** como elemento de construcción. (Soldadura del acero laminado y forjado.) (2 400 palabras & fig.) (Continuará.)

Boletín de la Asociación General de transportes por vía férrea. (Madrid.)

1935 **621 .43 (.460)**

Boletín de la Asociación General de transportes por vía férrea (suplemento), junio, p. 105.

Nuevos **automotores Diesel** de 90 C.V. para la Compañía del Norte. (2 800 palabras & fig.) (Continuará.)

Ferrocarriles y Tranvías. (Madrid.)

1935 **621 .132.3**

Ferrocarriles y Tranvías, julio, p. 198.

DUQUE DE LARAGOZA. — **Locomotoras de vapor** de gran velocidad. (3 000 palabras.)

1935 **621 .335 (.494)**

Ferrocarriles y Tranvías, julio, p. 202.

PHILIPPIN (M.). — Los nuevos **automotores eléctricos ligeros** de los Ferrocarriles Federales Suizos. (2 900 palabras & fig.)

Hormigón y Acero. (Madrid).

1935 **624 .63**

Hormigón y Acero, mayo, p. 193.

LOSSIER (H.). — El porvenir del **hormigón armado** y del **acero** en los puentes de gran luz. (5 000 palabras & fig.)

Ingenieria y Construcción. (Madrid.)

1935 **388 (.460)**

Ingenieria y Construcción, agosto, p. 496.

LOPEZ JAMAR (L.). — Los **enlaces ferroviarios** de Madrid. (5 000 palabras.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1935 **624 .63 (.45)**

Annali dei lavori pubblici, gennaio, p. 6.

FAGO (N.). — Il **ponte** « Littorio » sul Pescara a Pescara. (4 900 parole & fig.)

1935 **624 .2**

Annali dei lavori pubblici, gennaio, p. 48.

SOBRERO (L.). — Teoremi dei 2n, 4n, 6n moment per lo studio delle **structure iperstatiche.** (9 700 parol & fig.)

1935 **624 .63 (.45)**

Annali dei lavori pubblici, febbraio, p. 140.

KRALL (G.). — La nuova **passerella** sul Bisenzio a Prato. (1 600 parole & fig.)

La tecnica professionale. (Firenze.)

1935 **625 .216**

La tecnica professionale, agosto, p. 234.

CORBELLINI (G.). — Condizioni generali per l'**aggancio automatico dei treni.** (2 300 parole & fig.)

L'Ingegnere. (Roma.)

1935 **62. (01 & 691**

L'Ingegnere, agosto, p. 1.

SANTARELLA (L.). — **Elasticità dei laterizi.** (4 000 parole & fig.)

1935 **624 .5 (.73)**
L'Ingegnere, agosto, p. 8.
BOSA (L.). — **Il ponte sulla Porta d'Oro.** (4 000 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1935 **656 .225 (.45) & 656 .261 (.45)**
Rivista tecnica delle ferrovie italiane, 15 giugno, p. 313.
MARIANI (R.) & PEDEMONTI (G.). — **Carro trasportatore stradale** tipo F. S. specialmente adatto per trasporto di carri ferroviari dalla strada ferrata alla strada ordinaria. (3 300 parole & fig.)

1935 **385. (07.2(.45)**
Rivista tecnica delle ferrovie italiane, 15 giugno, p. 335.
BREAZZANO (A.). — Osservazioni sul metodo dei **blocchetti di legno** in uso nell'analisi tossimetrica delle sostanze conservatrici del legno. (6 400 parole & fig.)

1935 **621 .43**
Rivista tecnica delle ferrovie italiane, 15 luglio, p. 1.
CUTTICA (A.). — Organizzazione tecnica per l'esercizio e **riparazione delle automotrici.** (8 700 parole.)

1935 **625 .113**
Rivista tecnica delle ferrovie italiane, 15 luglio, p. 18.
SALVINI (F.). — **I raccordi** ad S. (7 500 parole.)

1935 **621 .335 (.45)**
Rivista tecnica delle ferrovie italiane, 15 luglio, p. 48.
BIANCHI (G.). — **Le locomotive a corrente continua** a 3 000 volt Gr. E. 428. (4 900 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1935 **624 .32 (.492)**
De Ingenieur, N° 30, 26 Juli, p. B. 159.
ROGGEVEEN (A.). — **Montage van de brug** over de Waal te Nijmegen. (1 900 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1935 **385. (09(.493)**
Spoor- en Tramwegen, Nr. 14, 2 Juli, p. 321.
In België — 1835. (3 100 woorden & fig.)

1935 **621 .43**
Spoor- en Tramwegen, Nr. 14, 2 Juli, p. 330.
HARDEMAN (W. F. K.). — De **Dieselmotor** voor tractie. (2 100 woorden.)

1935 **621 .132.3 (.493)**
Spoor- en Tramwegen, Nr. 16, 30 Juli, p. 374.
Het verkeerswezen op de tentoonstelling te Brussel. C. I. **sneltreinlocomotief** van de Nationale Maatschappij der Belgische Spoorwegen. (1 300 woorden & fig.)

1935 **625 .23 (0**
Spoor- en Tramwegen, Nr. 17, 13 August, p. 399.
HUG (Ad. M.). — **Het dood gewicht : een vijand der verkeersmiddelen.** (1 300 woorden & fig.)

In Polish.

(= 91.885)

Inżynier Kolejowy. (Warszawa.)

1935 **625 .2 = 91 .885**
Inżynier Kolejowy, N. 2/126, p. 34.
LABUC (L.) & RYTEL (Z.). — **Recherches sur la résistance aérodynamique** des véhicules de chemins de fer. (3 800 mots & fig.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa.)

1935 **656**
Gazeta dos caminhos de ferro, N° 1142, 16 de julio, p. 307; N° 1143, 1 de agosto, p. 327.
FERNANDO DE SOUSA (J.). — **Carril, estrada e água.** (5 800 palavras.)

Revista das Estradas de ferro. (Rio de Janeiro.)

1935 **625 .113**
Revista das Estradas de ferro, N° 239, 30 de junho, p. 894.
GOMIDE (J. C.). — Problema das **curvas** nas estradas de ferro. (1 200 palavras.)

1935 **656 (.81)**
Revista das Estradas de ferro, N° 241, 30 de julho, p. 926.
A central do Brasil e a concorrencia rodoviaria entre Rio e São Paulo. (2 100 palavras.) (Continúa.)

1935 **624 .2**
Revista das Estradas de ferro, N° 241, 30 de julho, p. 938.
GOMIDE (J. C.). — Vigas continuas dao pontes rodoviarias. (2 000 palavras & fig.)

In Rumanian.

(= 599)

Revista tecnica C. F. R. (Bucuresti.)

1934 **385. (07(.498) = 599**
Revista tecnica C. F. R., N° 3, p. 86.
SCHILEANU. — **School wagon for rolling stock examiners,** Rumanian State Railways. (1 800 words & fig.)

1934 **385 .57 = 599**
Revista tecnica C. F. R., N° 5, p. 140.
NESTOR. — **Psychotechnique applied to the railway staff.** (13 200 words & fig.)

1934 **691 = 599 & 721 .9 = 599**

Revista tecnica C. F. R., Nos 7-8, p. 213.

GANEA. — **Regulations on reinforced concrete structures.** (1 800 words.)

1935 **698 = 599**

Revista tecnica C. F. R., Nos 7-8, p. 217.

MAZILU. — **Testing paints.** (21 600 words, 1 table & fig.)

1934 **656 .24 = 599**

Revista tecnica C. F. R., N° 10, p. 307.

DIACONESCU. — **Delays in the conveyance of goods in international traffic.** (3 000 words.)

1934 **656 .24 = 599**

Revista tecnica C. F. R., N° 11, p. 329.

CIORANESCU. — **Containers** for the carriage of goods. (8 400 words & fig.)

In Serbian.

(= 91.882)

Saobračajni Pregled. (Beograd).

1934 **625 .144.2 = 91 .882**

Saobracajni Pregled, N° 12, p. 493.

KRSTIC. — **The distribution of short rails in railway curves.** (10 pages, diagr. & fig.)

1934 **385 .587 (.497.1) = 91 .882**

Saobracajni Pregled, N° 12, p. 502.

MILOSEVIC. — **Reorganisation of the workshops** of the Jugoslav State Railways. (8 pages, diagr. & 1 map.)

1934 **656 .222 = 91 .882**

Saobracajni Pregled, N° 12, p. 510.

REPIC. — **The sequence and overtaking of trains.** (7 pages.)

In Czech.

(= 91.886)

Casopis pro železnični právo a politiku. (Praha.)

1934 **656 .231 (.437) = 91 .886**

Casopis pro zeleznicni právo a politiku, N° 1, p. 4.

VANEK. — **Tariff simplifications** on the Czechoslovak State Railways. (2 400 words.)

1934 **385 .1 (.437 = 91 .886**
& 385 .524 (.437) = 91 .886

Casopis pro zeleznicni právo a politiku, N° 3, p. 37; N° 7, p. 117.

VSETECKA. — **Remarks in connection with the commercial management system with participation of the staff,** Czechoslovak State Rys. (11 200 words.)

1934 **656 = 91 .886**

Casopis pro zeleznicni právo a politiku, N° 5, p. 77; N° 6, p. 97; N° 7, p. 132.

KUNC. — **Waterways and railways,** and their coordination (Legal and economical considerations). (Germany and Czechoslovakia.) (12 800 words.)

1934 **385 .15 = 91 .886**

Casopis pro zeleznicni právo a politiku, N° 8, p. 137; N° 9, p. 170.

Railway autonomy with special reference to the Czechoslovak State Railways. (9 400 words.)

Železnični Revue. (Praha.)

1934 **385 (.437) = 91 .886**

Zeleznicni Revue, N° 1, p. 1.

KOLLER. — **Railway economics.** — Practical considerations. (3 150 words.)

1934 **621 .43 (.437) = 91 .886**

Zeleznicni Revue, N° 1, p. 6.

BULUSEK. — Trials of the « Littorina » light railcar on the Czechoslovak State Railways, December 1933. (1 400 words & fig.)

1934 **621 .4 = 91 .886**

Zeleznicni Revue, N° 2, p. 21.

ZAVODSKY. — The use of **producer gas** in road and rail transport. (2 450 words & fig.)

1934 **656 .225 = 91 .886**
& 656 .261 = 91 .886

Zeleznicni Revue, N° 3, p. 33.

SCHELLER. — **Containers** for the carriage of goods. (3 150 words & fig.)

1934 **621 .43 (.437) = 91 .886**

Zeleznicni Revue, N° 4, p. 53.

BULUSEK. — The « **Blue Arrow** » a new railcar of the Czechoslovak State Rys. (2 100 words & fig.)

1934 **385 .5 (.437) = 91 .886**

Zeleznicni Revue, N° 7, p. 97; N° 8, p. 113.

Projected new **staff regulations,** Czechoslovak State Rys. (4 900 words.)

1934 **385 .1 (.437) = 91 .886**
& 385 .524 (.437) = 91 .886

Zeleznicni Revue, N° 9, p. 129; N° 10, p. 149.

GREGOR. — **Publicity** on the Czechoslovak State Rys. (4 900 words.)

1934 **656 .225 (.45) = 91 .886**
& 656 .261 (.45) = 91 .886

Zeleznicni Revue, N° 9, p. 134.

Insulated and refrigerated **containers** for the carriage of foodstuffs in Italy. (1 400 words & fig.)

1934 **385 .1 (.437) = 91 .886**
& 385 .524 (.437) = 91 .886

Zeleznicni Revue, N° 9, p. 201.

VAVERKA. — **The commercial management system** which participation of the staff, Czechoslovak State Railways. (1 400 words.)

1934 **625 .11 (.437) = 91 .886**
Zeleznicni Revue, N° 14, p. 209.
KONERZA. — **Projected Moravská-Trebová-Puchov line, Czechoslovakia.** (2 450 words & 1 map.)

1934 **385 .5 (.437) = 91 .886**
Zeleznicni Revue, N° 15, p. 225; N° 16, p. 241.
CHMELAR. — Critical remarks in connection with the proposed new **staff regulations,** Czechoslovak State Rys. (5 600 words.)

1934 **625 .5 = 91 .886**
Zeleznicni Revue, N° 18, p. 273.
NEVRLY. — **Safety devices in carriage on telpher lines.** (2 100 words & fig.)

1934 **625 .1 (.437) = 91 .886**
Zeleznicni Revue, N° 19, p. 289.
BULUSEK. — **The new Cervená Skála-Margecany line, Czechoslovakia.** (2 800 words, fig. & 1 map.)

Zprávy železničních inženýrů. (Praha.)

1934 **625 .17 (.437) = 91 .886**
Zpravy zeleznicnich inzenyru, N° 1, p. 1.
HANISCH. — **Track maintenance and relaying** on the Czechoslovak State Railways. Technical needs and financial possibilities (Lecture before the Association of Engineers, 1-12-1933). (7 700 words & diagr.)

1934 **385 .1 (.437) = 91 .886**
Zpravy zeleznicnich inzenyru, N° 2, p. 15; N° 5, p. 83; N° 7, p. 113.
VAVERKA. — An analysis of the profits resulting from the application of **commercial management system with participation of the staff,** Czechoslovak State Rys. (14 850 words.)

1934 **355 = 91 .886**
Zpravy zeleznicnich inzenyru, N° 3, p. 35.
FIALA. — The importance of well organised means of **transport from the point of view of the defence of the country.** (2 750 words.)

1934 **656 (.437) = 91 .886**
Zpravy zeleznicnich inzenyru, N° 3, p. 49.
IBL. — **Rail and road coordination** in Czechoslovakia. (100 words.)

1934 **656 .222.1 = 91 886**
Zpravy zeleznicnich inzenyry, N° 4, p. 53.
DEYL. — **Limits to the increased speeds of railway vehicles.** (6 050 words & fig.)

1934 **621 .43 (.437) = 91 .886**
Zpravy zeleznicnich inzenyru, N° 4, p. 61.
NEUMANN. — New **railcars** for fast services on the Czechoslovak State Rys. (4 400 words & fig.)

1934 **625 .143.3 = 91 .886**
Zpravy zeleznicnich inzenyru, N° 1, p. 8; N° 2, p. 23; N° 3, p. 37; N° 6, p. 93.
DEYL. — **Stresses and fatigue in rails.** (15 950 words & fig.)

1934 **621 .135.3 = 91 .886**
Zpravy zeleznicnich inzenyru, N° 2, p. 27; N° 3, p. 41; N° 4, p. 58; N° 6, p. 97.
PROCHAZKA. — Changing strains and fatigue in **locomotive springs** when starting and braking. (14 300 words & fig.)

1934 **625 .234 = 91 .886**
Zpravy zeleznicnich inzenyru, N° 7, p. 109.
VORLICEK. — The calculation of the **heating surface of radiators** for railway carriages. (2 750 words.)

1934 **621 .135.5 = 91 .886**
Zpravy zeleznicnich inzenyru, N° 8, p. 124.
PROCHAZKA. — The use of the **compressed-air brake** on locomotives. (2 200 words.)

1934 **621 .135.4 (.437) = 91 .886**
Zpravy zeleznicnich inzenyru, N° 9, p. 139.
DEYL. — **Maximum speeds of steam locomotives and railcars on curved track.** (5 500 words.)

1934 **625 .5 = 91 .886**
Zpravy zeleznicnich inzenyru, N° 9, p. 145; N° 10, p. 160; N° 11, p. 172.
CECH. — **Funicular and telpher lines.** (8 800 words.)

1934 **656 .21 (.437) = 91 .886**
Zpravy zeleznicnich inzenyru, N° 10, p. 153.
MRAZ. — **The question of the Brno stations.** (3 300 words, fig. & tables.)

1934 **625 .144.2 = 91 .886**
Zpravy zeleznicnich inzenyru, N° 11, p. 167.
DEYL. — **The possibility of increasing the speed and comfort by means of certain alterations to the superelevation on curves and the straight sections between curves.** (1 550 words.)

1934 **621 .138.2 (.437) = 91 .882**
Zpravy zeleznicnich inzenyru, N° 11, p. 168.
FRIED. — **Locomotive coaling plant** on the Czechoslovak State Rys. (3 300 words & fig.)

M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General Secretary of the Permanent Commission of the International Railway Congress Association.

(NOVEMBER 1935)

[016. 385. (02]

I. — BOOKS.

In French.

1935 **621 .13 & 625 .2**

Annuaire 1935-1936 de la Chambre Syndicale des Fabricants et Constructeurs de matériel pour chemins de fer et tramways.

Paris (8e), Chambre syndicale susmentionnée, 7, rue de Madrid. 1 volume. 322 pages. (Prix : 40 fr. français.)

1935 **625 .234 & 625 .244**

BALCKE (H.).

La technique moderne de la protection contre la chaleur et le froid.

Paris, Dunod, 92, rue Bonaparte. 1 volume (13 × 21), 215 pages et 78 figures.

1935 **691 & 693**

DEBES (G.).

Maçonneries, béton, béton armé.

Paris, Léon Eyrolles. 1 volume, 467 pages, 148 figures et 6 planches. (Prix : 75 fr. français.)

1935 **385. (08 (.437)**

Rapport annuel de l'entreprise des Chemins de fer de l'Etat tchécoslovaque pour l'exercice 1934.

Praha, Tiskl, Josef Pacl v. Strakonicich. 1 volume, 120 pages, figures et 1 carte.

In German.

1935 **625 .1 (02**

Elsner Taschenbuch für den bautechnischen Eisenbahndienst.

Berlin, Otto Elsner Verlagsgesellschaft m. b. H. Band, über 300 Seiten und Abbildungen. (Preis : 2.50 R. M.)

1935 **656 .235.6**

GABRIEL (S. L.).

Aussenhandel und Eisenbahn-Gütertarifpolitik.

Berlin, Carl Heymanns Verlag und Wien, Österreichischer Wirtschaftsverlag, Kommanditgesellschaft Payer & Cº. 1 Band, 156 Seiten. (Preis : 7 R. M.)

1935 **62. (02**

« Hütte » des Ingenieurs Taschenbuch. 26. neubearbeitete Auflage. III. Band.

Berlin, Wilhelm Ernst und Sohn, Wilhelmstrasse, 90. 1 Band. (Preis : 16.50 R. M.)

1935 **385 .5 (.43)**

KIRSTEN (L.).

Die Personalpolitik der Deutschen-Reichsbahn-Gesellschaft von 1924 bis 1933. Band XIII : Probleme des Geld- und Finanzwesens.

Leipzig, Akademische Verlagsgesellschaft. 1 Band. (Preis : 5.20 R. M.)

1935 **625 .1**

SCHAU (A.).

Eisenbahnbau.

Leipzig und Berlin, B. G. Teubner. 1 Band. Sechste vollständig neu bearbeitete Auflage, 356 Abbildungen. (Preis : 10.50 R. M.)

1935 **62. (01 & 69**

THUN & WUNDERLICH.

Dauerbiegefestigkeit von Konstruktionstellen an Einspannungen, Nabensitzen und ähnlichen Kraftangriffstellen.

Berlin, V. D. I. Verlag, G. m. b. H. 1 Band. (Preis : 7.50 R. M.)

1935 **656 .1 (.43)**

VOLK (F.).

Der Aufbau der Gesellschaft « Reichsautobahnen ».

Leipzig, Concordia Verlag. 1 Band, 64 Seiten. (Preis : 2 R. M.)

1935 **625 .13**

WEGELE.

Tunnelbau.

Berlin und Leipzig, Walter de Gruyter & Cº. 1 Band. 139 Seiten und 98 Abbildungen. (Preis : 1.62 R. M.)

---

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. Weissenbruch, in the number for November 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

In English.

1935 **625 .142.2 (06 (.73) & 691 (06 (.73)**
AMERICAN WOOD-PRESERVERS' ASSOCIATION.
Proceedings of the thirty-first annual meeting, New York City, January 22-24, 1935.
Washington, D. C. Published by the Association. 390 pages, tables & fig.

1935 **621 .165**
BRADSHAW (C. S.).
The Association of Engineering and Shipbuilding Draughtsmen. — **Steam turbines.**
London. The Draughtsman Publishing Company, Ltd. (Price : 2 sh. net.)

1935 **385. (08 (.52)**
DEPARTMENT OF RAILWAYS. GOVERNMENT OF JAPAN.
Annual report for the year ending March 31st, 1934.
Tokyo. Printed at The Tokyo Tsukiji Type Foundry, Ltd. 300 pages, fig., diagrams, tables and a map.

1935 **0**
Europa. Vol. I. Encyclopedia of Europe. — A directory of the League of Nations and of international organisations. A review of peace treaty problems, world trade, social and economic conditions and a survey and directory of political, industrial, financial, cultural and scientific organisations in every European country.
London, W. C. 2. Europa Publications Ltd., 6 Duke Street, Adelphi. Part. I, 154 pages; Part. II, 667 pages; Part. III, 31 pages.

1935 **385 .15 (.71)**
FOURNIER (Leslie T.).
Railway nationalization in Canada.
Published by the Macmillan Company of Canada, Ltd. — United States copies available through the International Finance Section, Princeton University, Princeton, N. J. (Price : $ 3.50.)

1935 **624 .5**
FRANKLAND (F. H.).
Suspension bridges of short span.
New York. American Institute of Steel Construction. (Price : $ 3.50.)

1935 **385. (09 (.42)**
Great Western Railway centenary. Special number of the Railway Gazette.
London, S. W. 1, 33, Tothill Street, « The Railway Gazette », supplement to the issue for August 30, 1935. 52 pages & fig. (Price : 1 sh.)

1935 **669 .1**
GREAVES (R. H.), D. Sc.
Chromium steels.
London. Published by H. M. Stationery Office for the Department of Scientific and Industrial Research. 321 + VI pages. (Price : 7 sh. 6 d.)

1935 **621 .13 (02**
HUNT (A. F.).
Descriptive diagrams of the locomotive.
Shrewsbury. Wilding & Son, Ltd., 33, Castle Street (8 1/2 × 5 1/2 inches). Third edition. 52 pages. (Price : 1 sh. 6 d.)

1935 **0**
International Who's Who.
London, W. C. 2. Europa Publications Ltd., 6 Duke Street, Adelphi. 1 123 pages.

1935 **016 : 621 (06 (.42)**
INSTITUTION OF MECHANICAL ENGINEERS.
Brief subject and author index of papers in the proceedings, 1847-1934.
London, S. W. 1. Published by the Institution. Storey's Gate, St. James's Park. 140 pages.

1935 **624 .63**
Laboratory tests of three-span reinforced concrete arch ribs on slender piers.
Urbana, Ill. University of Illinois. Bulletin No. 269 of the University Engineering Experiment Station.

1935 **669**
ROSENHAIN (W.).
Introduction to the study of physical metallurgy.
London. Constable and Co. Third edition, revised and partly rewritten by J. L. Haughton. XVI + 368 pages. (Price : 20 sh.)

1935 **614 & 698**
Safety in spray painting. Monograph from the International Labour Office.
London. P. S. King & Son, Ltd. (Price : 4 sh. net.)

1935 **721 .9**
SHEDD (Th. C.).
Structural design in steel.
New York. John Wiley & Sons, Inc. London. Chapman and Hall, Ltd. (Price : 25 sh. net.)

1935 **621 .43**
SHEPHERD (Harold F.).
Diesel engine design.
New York. John Wiley and Sons, Inc. London. Chapman and Hall, Ltd. (Price : 17 sh. 6 d. net.)

1935 **698**
Symposium on paint and paint materials.
Philadelphia, Pa. American Society for Testing Materials, 260, South Broad Street. (Price : $ 1.50.)

1935 **621 .138**
The locomotive in service.
London, E. C. 4. The Locomotive Publishing Co. Ltd. 3, Amen Corner. 187 pages, tables & fig.

1935 **621 .43**
The modern diesel.
London, S. E. 1. Iliffe and Sons, Ltd., Dorset House Tudor Street. (Price : 3 sh. 6 d. net.)

In Spanish.

1935 **621 .33 (.460)**
GILBERT y SALINAS (A.) .
La electrificación de los ferrocarriles, empresa nacional.
Madrid, Nuevas Gráficas. 1 folleto (21.5 × 27.5) 58 páginas y 50 figuras.

[016. 385. (05]

II. — PERIODICALS.

In French.

Annales des Ponts et Chaussées (Paris).

1935 **625 .1 (.65)**

Annales des ponts et chaussées, juin, p. 905.

WECKEL. — Note sur les **grands travaux** en Algérie. (20 900 mots & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1935 **621 .116**

Bull. de la Soc. des ing. civ. de France, janvier-février, p. 42.

BARJOU. — Les **chambres de combustion** à parois froides compactes et le charbon pulvérisé. (12 200 mots, tableaux & fig.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1935 **656 (.4)**

Bull. de l'Union intern. des ch. de fer, juillet-août, p. 233.

Rapport des Chemins de fer allemands et des Chemins de fer Fédéraux suisses sur la question : **Concurrence et coopération** en trafics voyageurs et marchandises entre chemin de fer et automobile (juin 1935). (23 400 mots.)

1935 **313 .385**

Bull. de l'Union intern. des ch. de fer, juillet-août, p. 259.

Statistique internationale des chemins de fer. (3 900 mots.)

1935 **385. (09 (.64 + .65)**

Bull. de l'Union intern. des ch. de fer, septembre, p. 277.

Les chemins de fer de l'Afrique du Nord française. (10 800 mots.)

1935 **385 .113 (.493)**

Bull. de l'Union intern. des ch. de fer, septembre, p. 290.

Les Chemins de fer Fédéraux suisses pendant l'exercice 1934. (5 500 mots.)

1935 **621 .132.8**

Bull. de l'Union intern. des ch. de fer, septembre, p. 299.

Les **trains aérodynamiques à vapeur.** (2 400 mots.)

Chronique des transports. (Paris.)

1935 **656 (.4)**

Chronique des transports, n° 16, 25 août, p. 3.

L'économie du **transport aérien en Europe.** (8 000 mots.)

1935 **656**

Chronique des transports, n° 17, 10 septembre, p. 4.

La **coordination des transports** au 8e Congrès de la Chambre de Commerce Internationale. (3 200 mots.)

Génie civil. (Paris.)

1935 **621 .132 .8 (.42)**

Génie civil, N° 2768, 31 août, p. 193.

La **locomotive à turbines** du London Midland & Scottish Railway. (2 800 mots & fig.)

1935 **669**

Génie civil, N° 2768, 31 août, p. 204.

BONZEL (M.). — Les déformations accompagnant les **traitements thermiques** des métaux écrouis. (900 mots & fig.)

1935 **625 .4 (.47)**

Génie civil, N° 2769, 7 septembre, p. 213.

VICHNIAK. — Le **chemin de fer métropolitain** de Moscou. (5 700 mots & fig.)

1935 **621 .116**

Génie civil, N° 2769, 7 septembre, p. 246.

Perfectionnements apportés au **générateur de vapeur Velox,** système Brown-Boveri. (1 500 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1935 **621 .43 (.73)**

Les Chemins de fer et les Tramways, septembre, p. 231.

SPIESS (E.). — **Rames automotrices** Diesel-électriques aux Etats-Unis. (12 600 mots & fig.)

1935 **621 .134.3**

Les Chemins de fer et les Tramways, septembre, p. 240.

Surchauffeur pour locomotive à haute pression. (1 600 mots & fig.)

1935 **621 .133.1**

Les Chemins de fer et les Tramways, septembre, p. 243.

Brûleur à mazout pour locomotive à vapeur. (1 000 mots & fig.)

1935 **621 .33 (.44)**

Les Chemins de fer et les Tramways, septembre, p. 245.

L'**électrification** des lignes de montagne sur le réseau d'Orléans. (1 200 mots & fig.)

1935 **621 .335**

Les Chemins de fer et les Tramways, septembre, p. 247.

Bogie moteur électrique. (1 200 mots & fig.)

1935 **621 .333**
Les Chemins de fer et les Tramways, septembre, p. 248.
Mécanisme moteur pour locomotive électrique. (1 400 mots & fig.)

1935 **691**
Les Chemins de fer et les Tramways, septembre, p. 249.
L'acier-béton alpha dans les chemins de fer. (700 mots et fig.)

1935 **625 .13**
Les Chemins de fer et les Tramways, septembre, p. 250.
CHARRIN (V.). — Le déblayage dans les **creusements rapides de tunnel.** (1 200 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1935 **625 .232 (.64)**
Revue générale des chemins de fer, septembre, p. 141.
VALLANCIEN (J.). — Les **voitures de grandes lignes** de la Compagnie des Chemins de fer du Maroc étudiées par l'Office Central d'Etudes de Matériel de Chemins de fer. (4 400 mots & fig.)

1935 **625 .13 (.44)**
Revue générale des chemins de fer, septembre, p. 157.
COFFRE & JENN. — **Réparation et renforcement du saut de mouton** au point kilométrique 4485 de l'avant-gare de Paris-Nord. (2 000 mots & fig.)

1935 **313 .385 (.44)**
Revue générale des chemins de fer, septembre, p. 164.
Résultats obtenus en 1934 sur les Grands Réseaux de chemins de fer français. (9 tableaux.)

1935 **656 .213 (.44)**
Revue générale des chemins de fer, septembre, p. 178.
La nouvelle **gare maritime** du Havre. (900 mots & fig.)

Revue universelle des Mines. (Liége.)

1935 **385. (09.3 (.493)**
Revue universelle des mines, septembre, p. 389.
LAMALLE (U.). — Le **centenaire des chemins de fer belges.** (4 500 mots, 2 tableaux & fig.) (A suivre.)

In German.

Archiv für Eisenbahnwesen. (Berlin.)

1935 **656 (.43)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 525; Heft 4, Juli-August, S. 817.
HILDEGARD ENDE. — Die **Verkehrsdichte** des Deutschen Reichs. (27 400 Wörter & Abb.)

1935 **385 .1 (.44)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 585.
REINHARDT. — **Finanzielle Entwicklung** und Haushaltsplan 1935 der französischen Eisenbahnen. (4 500 Wörter.)

1935 **385 .113 (.497.2)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 601.
REMY & UHLICH. — Die **bulgarischen Staatseisenbahnen** und- häfen 1931-1932. (4 200 Wörter.)

1935 **385 (.47)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 617.
SMIRNOW. — Zur gegenwärtigen **Lage des russischen Eisenbahnwesens.** (6 200 Wörter.)

1935 **385 .113 (.436)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 635.
ROESNER (E.). — Die **österreichischen Bundesbahnen** in den Jahren 1932 und 1933. (6 500 Wörter.)

1935 **385 .113 (.45)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 673.
Die **italienischen Staatsbahnen** im Rechnungsjahr 1932-33. (5 300 Wörter.)

1935 **385 .113 (.492)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 697.
OVERMANN. — Die **Niederländischen Eisenbahnen** im Jahre 1933. (8 300 Wörter.)

1935 **385 .113 (.52)**
Archiv für Eisenbahnwesen, Heft 3, Mai-Juni, S. 728.
SCHELLE. — Die **Eisenbahnen Japans** im Rechnungsjahr 1932-33. (3 400 Wörter.)

1935 **38**
Archiv für Eisenbahnwesen, Heft 4, Juli-August, S. 793.
GOTTI-OTTLILIENFELD (F. v.). — Volkswirtschaft und **Verkehr.** (8 900 Wörter.)

1935 **385. (09.3**
Archiv für Eisenbahnwesen, Heft 4, Juli-August, S. 851.
STUMPF (B.). — England, das Mutterland des Eisenbahnwesens, und die **erste deutsche Eisenbahn** : Nürnberg-Fürth. (12 200 Wörter & Abb.)

1935 **385 .113 (.437)**
Archiv für Eisenbahnwesen, Heft 4, Juli-August, S. 905.
FREYTAG (A.). — Die **Eisenbahnen** der tschechoslowakischen Republik im Jahre 1933. (10 000 Wörter.)

1935 **385 .113 (.439)**
Archiv für Eisenbahnwesen, Heft 4, Juli-August, S. 937.
BELA ROMAK. — Die **Königlich Ungarischen Staatsbahnen.** (3 000 Wörter.)

1935 **385 .113 (.42)**
Archiv für Eisenbahnwesen, Heft 4, Juli-August, S. 993.
HARDT. — **Wirtschafts- und Betriebs-Ergebnisse** der englischen Gruppenbahnen im Jahre 1934. (2 000 Wörter.)

Die Lokomotive. (Wien.)

1935 **621 .132.8 (.436)**

ie Lokomotive, August, S. 137.

SEIDL (O.). — **1 B 1 Gepäcks-Dampftriebwagen** eihe D T 1 der Österreichischen Bundesbahnen. (3 200 örter & Abb.)

Glasers Annalen. (Berlin.)

1935 **624 .2**

lasers Annalen. Heft 4. 15. August. S. 29.

SONNTAG (R.). — Schubspannungen in keiligen **Bal**en. (3 800 Wörter & Abb.) (Schluss folgt.)

---

rgan für die Fortschritte des Eisenbahnwesens. (Berlin.)

1935 **625 .113**

rgan für die Fortschritte des Eisenbahnwesens, Heft 17. 1. September, S. 331.

SZMODITS (K.). — Absteckung und Berichtigung n **Gleisbogen.** (13 600 Wörter, 3 Tabellen & Abb.)

---

eitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1935 **621 .392**

itsch. des Ver. deutsch. Ing., Nr. 36, 7. September, S. 1080.

STRELOW (W.). — Entwicklung und Verwendung r Elektroden in der **Lichtbogenschweissung.** (4 500 örter & Abb.)

1935 **621 .43 (.43)**

itsch. des Ver. deutsch. Ing., Nr. 37, 14. September, S. 1111.

BREUER (M.). — **Schnelltriebwagen** der Deutschen eichsbahn. (4 200 Wörter & Abb.)

1935 **624**

itsch. des Ver. deutsch. Ing., Nr. 37, 14. September, S. 1119.

KAYSER (H.) & KÜHL (E.). — Die Reibungswiderände an den beweglichen Lagern von **Eisenbahnbrüken.** (3 400 Wörter, 4 Tafeln & Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

1935 **656 .254 (.43)**

itschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 12. 10. September, S 137.

LÜTGERT. — Die selbsttätigen **Warnanlagen an** egübergängen bei der Deutschen Reichsbahn. (2 400 örter & Abb.)

1935 **625 .25 (.42)**

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 12, 10. September, S. 142.

LASCELLES (T. S.). — Neuere Fortschritte im englischen **Eisenbahn-Signalwesen.** (2 000 Wörter & Abb.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1935 **621 .138.2**

Zeitung des Vereins mitteleurop. Eisenbahnverw, Nr. 34, 22. August, S. 709.

VELTE. — **Brennstoffwirtschaft** bei Dampflokomotiven auf praktisch wissenschaftlicher Grundlage. (3 700 Wörter & Abb.)

1935 **656 .1 (.43)**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 35, 29. August, S. 721.

VON BECK. — Die neue **Ordnung des Güterfernverkehrs** mit Kraftfahrzeugen im Deutschen Reiche. (10 400 Wörter.)

1935 **656 .21 (.492)**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 35, 29. August, S. 737.

TISSOT VAN PATOT (J. P. B.). — Die **Eisenbahnbauten** in Amsterdam-Ost. (1 900 Wörter & Karte.)

1935 **385. (09 (.494)**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 36, 5. September, S. 747.

Eigenart und Bedeutung der **Schweizerischen Bundesbahnen** im Vergleich zu anderen Vereinsbahnen. (3 600 Wörter & Abb.)

1935 **625 .253**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 36. 5. September, S. 760.

CHRISTEN (F.). — Das **vollautomatische Führerventil der Knorr-Bremse A. G.** (1 000 Wörter & Abb.)

1935 **656**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 37, 12. September, S. 773.

FRÖLICH. — Der Zusammenhang der betrieblichen und technischen Pläne untereinander und mit dem **Wagenaufkommen.** (3 200 Wörter & Abb.)

1935 **385 .113 (.485)**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 37, 12. September, S. 783.

PASZKOWSKI. — Die **Schwedischen Staatsbahnen** im Jahre 1934. (1 900 Wörter.)

1935 **385 .113 (.44)**

Zeitung des Vereins mitteleurop. Eisenbahnverw., Nr. 38, 19. September, S. 798.

WERNEKKE. — Die **französischen Eisenbahnen** im Jahre 1934. (3 700 Wörter.)

In English.

Engineer. (London.)

1935 **385 .1 (.42)**
Engineer, No. 4151, August 2, p. 108; No. 4152, August 9, p. 137; No. 4153, August 16, p. 162; No. 4154, August 23, p. 186.
British railways as a national asset. (17 700 words.)

1935 **656 .211.7 & 699**
Engineer, No. 4151, August 2, p. 114.
TRIPP (G. W.). — Developments in **cross-Channel packets.** (3 800 words & fig.)

1935 **621 .31**
Engineer, No. 4151, August 2, p. 121.
BAUMANN (F. C.). — Industrial **sub-station equipments.** (3 300 words & fig.)

1935 **621 .392**
Engineer, No. 4151, August 2, p. 122.
A. C. welding equipment. (700 words & fig.)

1935 **656 .212.6 (.51)**
Engineer, No. 4151, August 2, p. 124.
A large **wagon tippler for China.** (700 words & fig.)

1935 **656 .225 (.42)**
Engineer, No. 4151, August 2, p. 125.
British freight rolling stock. (600 words & fig.)

1935 **62. (01 & 669**
Engineer, No. 4152, August 9, p. 138.
FULLARD (J. R.). — A theory of the **plastic state in metals.** (2 400 words & fig.)

1935 **624 (.71)**
Engineer, No. 4153, August 16, p. 160.
The Vaudreuil **rigid frame bridge.** (2 700 words & fig.)

1935 **621 .135.2 (.42)**
Engineer, No. 4153, August 16, p. 168.
The **roller bearings** on the L. M. S. turbomotive. (700 words & fig.)

1935 **621 .31**
Engineer, No. 4153, August 16, p. 176.
Voltage-regulating gear for transformers. (4 200 words & fig.)

1935 **621 .39 & 621 .8**
Engineer, No. 4154, August 23, p. 184.
Electric driving. (2 800 words & fig.)

1935 **621 .392**
Engineer, No. 4154, August 23, p. 190.
Electric seam welding machines. (2 600 words & fig.)

1935 **62. (01**
Engineer, No. 4154, August 23, p. 201.
An **electro-magnetic fatigue tester.** (700 words.)

1935 **625 .232 (.42**
Engineer, No. 4154, August 23, p. 202.
New first-class **sleeping cars,** L. M. S. Ry. (600 word & fig.)

1935 **621 .11**
Engineer, No. 4154, August 23, p. 203.
DEAN (E. S.). — The Velox **hot water-boiler.** (1 40 words & fig.)

1935 **621 .8 & 621 .3**
Engineer, No. 4155, August 30, p. 210; No. 4156, September 6, p. 234; No. 4157, September 13, p. 258 No. 4158, September 20, p. 284.
Electric driving. (12 100 words & fig.)

1935 **621 .133.**
Engineer, No. 4155, August 30, p. 216.
GIESL-GIESLINGEN (A.). — The **locomotive blas pipe.** (4 200 words & fig.)

1935 **621 .**
Engineer, No. 4155, August 30, p. 222.
WINDRED (G.). — **Electrical contacts.** (2 900 word & 2 tables.)

1935 **621 .**
Engineer, No. 4155, August 30, p. 224.
Performance of **cotterway and key-seating machines** (1 100 words, 5 tables & fig.)

1935 **62. (0**
Engineer, No. 4155, August 30, p. 226.
Compound lever testing machine for Russia. (70 words & fig.)

1935 **62 (01, 62 (06 & 624 (**
Engineer, No. 4156, September 6, p. 240.
WILSON (J. S.). — The **stability of structures.** (Pre sidential address to Section G, British Association Norwich, September 5th, 1935.) (5 400 words.)

1935 **621. (064 (.42**
Engineer, No. 4157, September 13, p. 263; No. 415 September 20, p. 298.
The **Shipping, Engineering and Machinery Exhibitio** at Olympia. (7 100 words, fig. & supplement.)

1935 **621 .335 (.68**
Engineer, No. 4157, September 13, p. 266.
Electric locomotives for the South African Railways (1 000 words & fig.)

1935 **62 (06 (.42**
Engineer, No. 4157, September 13, p. 270.
The British Association. — Meeting held at Norwich 4-11 September 1935. — **Redundant structures.** — **Stresses in overstrained material.** — **Noise,** etc. (5 60 words.)

1935 **387 (06 & 627 (0**
Engineer, No. 4157, September 13, p. 272.
XVIth International **Congress of Navigation,** Brussels 1935. (3 900 words & fig.)

1935 **621 .31**
Engineer, No. 4157, September 13, p. 274.
A visit to a **transformer works.** (2 200 words & fig.)

1935 **669**
Engineer, No. 4157, September 13, p. 277.
BROWNSDON (H. W.). — **Metal melting.** — Its effect on quality. (6 000 words.)

1935 **62 (06 (.42)**
Engineer, No. 4158, September 20, p. 296.
The British Association. II. — **Diesel engines and coastal shipping.** — **Dielectrics at high frequency.** — **Surges in transmission.** — The **specification of magnetic qualities.** (5 000 words.)

1935 **669 .1 (06 (.42)**
The Metallurgist, p. 49, Supplt. to the Engineer, August 30.
The **Alloy Steel Research Committee.** (900 words.)

1935 **669 .1**
The Metallurgist, p. 50, Supplt. to the Engineer, August 30.
Physical chemistry of steel making. (1 900 words.)

1935 **62. (01 & 669 .1**
The Metallurgist, p. 52, Supplt. to the Engineer, August 30.
Influence of **nitrogen** and **oxygen** on the **age-embrittlement of steel.** (600 words & fig.)

1935 **62. (01 & 669 .1**
The Metallurgist, p. 53, Supplt. to the Engineer, August 30.
Nitrogen case-hardening of steels. (2 100 words, 1 table & fig.)

1935 **669 .1**
The Metallurgist, p. 56, Supplt. to the Engineer, August 30.
JONES (W. D.) & PARKER (R. T.). — The **zinc-iron equilibrium diagram.** (2 000 words & fig.)

1935 **669 .1**
The Metallurgist, p. 58, Supplt. to the Engineer, August 30.
Copper steel castings. (1 500 words, 2 tables & fig.)

1935 **669 .1**
The Metallurgist, p. 60, Supplt. to the Engineer, August 30.
Chromium steels. (1 500 words & fig.)

Engineering. (London.)

1935 **62. (01**
Engineering, No. 3627, July 19, p. 54.
The « Oxford » **impact machine.** (1 400 words & fig.)

1935 **621 .93 (.42)**
Engineering, No. 3627, July 19, p. 60.
Crypto general-purpose band saw for metal. (600 words & fig.)

1935 **621 .94 (.42)**
Engineering, No. 3627, July 19, p. 62.
Precision grinding machine for small cylindrical parts. (1 000 words & fig.)

1935 **625 .4 (.42) & 656 .211 (.42)**
Engineering, No. 3628, July 26, p. 79.
The **reconstruction** of Leicester-Square **Station,** London. (3 000 words & fig.)

1935 **62. (01 & 669 .1**
Engineering, No. 3628, July 26, p. 87.
SANDIFER (D. A. N.). — The **embrittlement of steels** due to soaking at high temperatures. (1 500 words, 2 tables & fig.)

1935 **51. (08**
Engineering, No. 3628, July 26, p. 88.
Differential analyser at Manchester University. (2 600 words & fig.)

1935 **621 .33 (.439)**
Engineering, No. 3628, July 26, p. 92.
Electric traction in Hungary. (400 words.)

1935 **621 .95**
Engineering, No. 3629, August 2, p. 105; No. 3631, August 16, p. 157.
SIMON (R. O.). — The development of **rock drills.** (7 400 words & fig.)

1935 **656 .212.6 (.51)**
Engineering, No. 3629, August 2, p. 114.
60-ton **wagon tippler** for Chinese Railways. (1 300 words & fig.)

1935 **624 .32 (.42)**
Engineering, No. 3630, August 9, p. 131.
The Hamilton **unit system of bridge construction.** (4 000 words & fig.)

1935 **62. (01 & 621 .43**
Engineering, No. 3632, August 23, p. 183.
Cathode-ray **oscillograph engine indicator.** (4 500 words & fig.)

1935 **621 .31**
Engineering, No. 3632, August 23, p. 186.
CHARD (F. de la C.). — Technical and economic aspects of **electrical generation.** — I. (2 800 words & fig.)

1935 **625 .232 (.42)**
Engineering, No. 3632, August 23, p. 192.
First-class **sleeping car** for the London Midland & Scottish Ry. (900 words & fig.)

1935 **621 .31**
Engineering, No. 3633, August 30, p. 213.
CHARD (F. de la C.). — Technical and economic aspects of **electrical generation.** — II. (2 400 words, tables & fig.)

1935 **621 .43 (.439)**
Engineering, No. 3633, August 30, p. 215.
The Ganz **diesel-engined rail car.** (3 000 words & fig.)

1935 **016**
Engineering, No. 3633, August 30, p. 230.
BRADFORD (S. C.). — The organisation of a **library service in science and technology.** (4 800 words.)

1935 **621 .392 (.42)**
Engineering, No. 3634, September 6, p. 245.
The **training of electric welders.** (1 100 words & fig.)

1935 **621 .335 (.43)**
Engineering, No. 3634, September 6, p. 257.
Electric passenger locomotives for the German State Railways. (500 words & fig.)

1935 **621. (064 (.42)**
Engineering, No. 3635, September 13, p. 265; No. 3636, September 20, p. 293.
Shipping, Engineering and Machinery Exhibition at Olympia. (18 000 words & fig.)

1935 **62. (06 (.42)**
Engineering, No. 3635, September 13, p. 280.
The British Association. Meeting at Norwich. — Section G. — Engineering : Method of solving **redundant structures.** — **Stresses in overstrained materials.** — Report of Committee on **noise.** (4 200 words.)

1935 **669 (06 (.42)**
Engineering, No. 3635, September 13, p. 282.
The Institute of Metals, Newcastle meeting. — **Metal melting.** — Its effect on quality. (3 800 words.)

1935 **62. (01 (.42), 62 (06 (.42) & 624 (0 (.42)**
Engineering, No. 3635, September 13, p. 287; No. 3636, September 20, p. 319.
WILSON (J. S.). — The **stability of structures.** (4 700 words.)

1935 **62 (06 (.42) & 62. (01 (.42)**
Engineering, No. 3635, September 13, p. 291.
Stresses in overstrained materials. (1 800 words.)

1935 **669 .1**
Engineering, No. 3636, September 20, p. 304.
The **heterogeneity of steel ingots.** (5 000 words.)

1935 **621 .335 (.68)**
Engineering, No. 3636, September 20, p. 314.
Electric locomotives for South Africa. (500 words.)

Engineering News-Record. (New York.)

1935 **624 .8 (.73)**
Engineering News-Record, No. 3, July 18, p. 71.
New **bridges remove bottlenecks** on Boston shore highways. (2 700 words & fig.)

1935 **624 (.49**
Engineering News-Record, No. 4, July 25, p. 116.
RUCQUOI (L.). — **Vierendeel truss bridges** popul in Belgium. (900 words, 1 table & fig.)

1935 **624 .52 (.73**
Engineering News-Record, No. 6, August 8, p. 177.
New York's Triborough **bridge.** (**Suspension span** 1 380 ft. carried by two cables 98 ft. apart.) (4 5 words & fig.)

1935 **624. (0 (.73**
Engineering News-Record, No. 7, August 15, p. 215.
Inspection of aluminum bridge floor. — Smithfie Street bridge (Pittsburgh). (400 words.)

1935 **624 .52 (.73**
Engineering News-Record, No. 7, August 15, p. 218.
Suspension-bridge towers erected with **guy** derric (2 000 words & fig.)

1935 **55, 62. (01 & 721**
Engineering News-Record, No. 7, August 15, p. 228.
SHEPHARD (E. R.). — **Searching for foundatio beds by electricity and sound.** (2 900 words & fig.)

1935 **624 .1 (.73) & 627 (.73**
Engineering News-Record, No. 8, August 22, p. 245.
CONE (R. G.). — Battling storm and tide in found ing Golden Gate **Pier.** (4 500 words & fig.)

1935 **627 (.42) & 656 .213 (.42**
Engineering News-Record, No. 8, August 22, p. 265.
TRATMAN (E. E. R.). — **Concrete trestle type qua** at English marine terminal. (3 200 words & fig.)

1935 **627 .82 (.73**
Engineering News-Record, No. 9, August 29, p. 279.
LARKIN (Th. B.). — Fort Peck project and **dam** A series of articles outlining the planning, investiga tion and construction procedure in building the world' greatest earth dam.

1935 **55 & 62. (0**
Engineering News-Record, No. 10, September 5, p. 32
CASAGRANDE (A.). — New facts in **soil mechanic** from the research laboratories. (2 300 words & fig.)

1935 **624**
Engineering News-Record, No. 10, September 5, p. 33
MERRIAM (K. G.). — **Beam-strengthening effect o end connections.** (1 600 words, 2 tables & fig.)

Great Western Railway Magazine. (London.)

1935 **385 (09 (.42**
Great Western Ry. Mag., September, p. 439.
G. W. Ry. centenary number. — A series of 2 articles showing the **development of the G. W. Ry from its inception to the present day.**

Journal, Institution of Engineers, Australia. (Sydney, N. S. W.)

1935 **624 .63**
Journal Institut. of Engineers, Australia, June, p. 193.
KARMALSKY (V.) & BRITTON (A. T.). — **Bow-string arch with temporary hinge.** (4 300 words & fig.)

1935 **385 (09 (.942)**
Journal Institut. of Engineers, Australia, June, p. 217.
ANDERSON (C. B.). — Developments in railway engineering. — **Permanent way, signalling and locomotives** with particular reference to South Australia. (4 700 words & fig.)

Journal, Permanent Way Institution.

1935 **625 .17 (.42) & 625 .4 (.42)**
Journal, Permanent Way Institution, August, p. 188.
WINDMILL (H.). — **Maintenance problems appertaining to permanent way** on the railways of the London Passenger Transport Board. (7 800 words & fig.)

1935 **625 .122 (.42) & 625 .173 (.42)**
Journal, Permanent Way Institution, August, p. 210.
WHEELER (A.). — **Temporary packing of flooded track.** (700 words.)

1935 **625 .62 (.42)**
Journal. Permanent Way Institution, August, p. 212.
GREIG (L. C.). — **Permanent way for a modern tramway system.** (2 800 words.)

1935 **625 .172 (.42)**
Journal. Permanent Way Institution, August, p. 219.
JONES (S. R.). — A lengthman's appreciation of **the weed killing spray.** (800 words.)

1935 **385 .587 & 625 .172**
Journal. Permanent Way Institution, August, p. 222.
WILLIAMS (H.). — **Qualities and aims of a length ganger.** (3 000 words.)

Journal, Western Society of Engineers. (Chicago.)

1935 **625 .111 (.73)**
Journal. West. Soc. of Engineers, June, p. 83.
RIDGWAY (A.). — The Dotsero **cutoff.** (900 words & fig.)

1935 **625 .111 (.73) & 625 .162 (.73)**
Journal. West. Soc. of Engineers, June, p. 113.
Highway grade crossings. — Their elimination and protection. (5 800 words.)

Mechanical Engineering. (New York.)

1935 **621 .116**
Mechanical Engineering, August, p. 469.
MEYER (A.). — The **Velox steam generator.** (5 000 words, 1 table & fig.)

1935 **621 .43 (.73)**
Mechanical Engineering, August, p. 479.
ARNSTEIN (K.). — « The Comet » **high-speed train.** (1 700 words & fig.)

1935 **621 .13 & 621 .43**
Mechanical Engineering, August, p. 519.
Railroad engineering. — **Superspeed railroad trains.** (1 000 words.)

1935 **621 .43**
Mechanical Engineering, August, p. 520.
Electrical power transmission in Diesel-driven motor coaches. (500 words.)

1935 **621 .2 (.73)**
Mechanical Engineering, September, p. 539.
WHITE (W. M.). — The construction of the **115 000 h. p. Boulder dam turbines.** (3 600 words & fig.)

1935 **621 .43 (.73)**
Mechanical Engineering, September, p. 547.
DICKSON (J.). — The **diesel engine for rail transportation.** (4 600 words & fig.)

1935 **621 .43 (.73)**
Mechanical Engineering, September, p. 553.
ARNSTEIN (K.). — **« The Comet » high-speed train.** (5 600 words & fig.)

Modern Transport. (London.)

1935 **621 .335 (.54) & 621 .43 (.54)**
Modern Transport, No. 854, July 27, p. 3.
Diesel locomotives for India, for Lahore-Karachi **express service.** (1 500 words & fig.)

1935 **625 .244 (.42) & 656 .225 (.42)**
Modern Transport, No. 854, July 27, p. 5.
HARTLEY (Sir H.). — **Transport of perishable produce** by rail. (3 300 words.)

1935 **38 & 656 .2**
Modern Transport, No. 854, July 27, p. 7.
CLARK (G. G.) & ASHCROFT (E. W.). — **Regional planning and railway transport.** — Influence of electrification. (2 500 words.)

1935 **385**
Modern Transport, No. 855, August 3, p. 2.
Railways and their development. (1 600 words.)

1935 **621 .132.8 (.73) & 625 .232 (.73)**
Modern Transport, No. 855, August 3, p. 3.
Streamlined locomotives and passenger coaches for Chicago-St. Louis service and **lighter all-metal freight cars.** (1 400 words & fig.)

1935 **38 (.8) & 656 (.8)**
Modern Transport, No. 855, August 3, p. 4.
Trade and transport in Latin America. (2 200 words.)

1935 **656 .225 (.42)**
Modern Transport, No. 855, August 3, p. 5.
Insulated containers for meat and fruit traffic, L. M. S. Ry. (1 000 words & fig.)

1935 **621 .13 (0**
Modern Transport, No. 855, August 3, p. 6.
Possible developments in locomotive design. — Direct drive — Compounding — Feedwater heating. (1 600 words.)

1935 **625 .5 (.494)**
Modern Transport, No. 855, August 3, p. 7.
HUNZIKER (F.). — **Schwyz-Stoss funicular railway.** (1 800 words & fig.)

1935 **621 .33 (.45)**
Modern Transport, No. 856, August 10, p. 3.
The **Piacenza-Bettola electric railway line.** (1 500 words & fig.)

1935 **385 (.73)**
Modern Transport, No. 856, August 10, p. 4.
BUDD (R.). — **United States railway problems. — Present status and future outlook.** (2 400 words.)

1935 **625 .245 (.42)**
Modern Transport, No. 856, August 10, p. 5.
Freight rolling stock on British railways. — **Exceptional loads and special traffics.** (1 200 words & fig.)

1935 **621 .132.3 (.56)**
Modern Transport, No. 857, August 17, p. 3.
British-built locomotives for Palestine Railways. (600 words & fig.)

1935 **625 .232 (.41)**
Modern Transport, No. 857, August 17, p. 3.
Steel-covered train for Dublin-Cork service. (600 words & fig.)

1935 **656 .225 (.45) & 656 .261 (.45)**
Modern Transport, No. 857, August 17, p. 4.
Haulage of railway wagons by road. — An interesting Italian trolley. (600 words & fig.)

1935 **621 .33 (.485)**
Modern Transport, No. 857, August 17, p. 6.
Railway electrification in Sweden. — A successful policy. (1 600 words & fig.)

1935 **656 (.54)**
Modern Transport, No. 857, August 17, p. 8.
LACEY (J. M.). — **Transport problems in India.** — Evolution of roads and railways. (1 200 words.)

1935 **621 .232 (.42)**
Modern Transport, No. 858, August 24, p. 3.
New **sleeping cars** for L. M. S. Ry. — Welded bogies and underframes. (900 words & fig.)

1935 **621 .43 (.42)**
Modern Transport, No. 858, August 24, p. 5.
A. E. C. **oil-engined units** with Gloucester bodies, G. W. Ry. (1 400 words & fig.)

1935 **621 .43 (.42**
Modern Transport, No. 858, August 24, p. 6.
A new **oil engine for light vehicles.** (1 600 word & fig.)

1935 **621 .43 (.518**
Modern Transport, No. 858, August 24, p. 7.
New Sulzer **railcar engine** for South Manchuri (700 words & fig.)

1935 **621 .132.8 (.62**
Modern Transport, No. 860, September 7, p. 3.
Articulated steam railcars for Egypt (Cairo-Sue passenger services). (2 700 words & fig.)

1935 **621 .335 (.43**
Modern Transport, No. 860, September 7, p. 4.
New **A. E. G. 4 000 h. p. electric locomotive wit closed quill drive in Germany.** (500 words.)

1935 **621 .338 (.494**
Modern Transport, No. 860, September 7, p. 5.
High-speed railcars in Switzerland. — **Electric an diesel-driven units.** (1 000 words & fig.)

1935 **624. (0 & 624 .**
Modern Transport, No. 860, September 7, p. 6.
WILSON (J. S.). — **Stability of bridge structures** — Important contributory factors. (1 800 words.)

Proceedings, American Society of Civil Engineers (New York.)

1935 **62. (01 & 721 .**
Proceed., Amer. Soc. of Civil Engineers, August, p. 823
CUMMINGS (A. E.). — **Distribution of stresse under a foundation.** (3 300 words, tables & fig.)

Proceedings, Institution of Civil Engineers. (London.)

1933-34 **625 .14**
Proceed., Institut. of Civil Engineers, Vol. 238, Part 2 p. 3.
LAW (E. F.) & HARBORD (V.). — **Steel rails** (Paper and discussion.) (34 000 words & fig.)

1933-34 **624 .62 (.944**
Proceed., Institut. of Civil Engineers, Vol. 238, Part 2
SYDNEY HARBOUR BRIDGE : **Design of the struc ture and foundations,** by R. FREEMAN, p. 153.
Manufacture of the structural steelwork and erectio of the bridge, by R. FREEMAN & L. ENNIS, page 194
Calculations for the steel superstructure, by J. F PAIN & G. ROBERTS, p. 256.
The Sydney Harbour Bridge and **approaches,** by J. J. C. BRADFIELD, p. 310.
Discussion and correspondence on Sydney Harbou Bridge, page 402. (140 000 words, tables, plates & fig.

1933-34 **621 .4**
Proceed., Institut. of Civil Engineers, Vol. 238, Part 2 p. 477.
FOWLER (Sir Henry). — The **progress of auto mobile engineering.** (14 000 words.)

Railway Age. (New York.)

1935 **625 .245 (.73)**
Railway Age, No. 26, June 29, p. 1001.
C. & O. **light-weight hopper car** has many new features. (1 500 words & fig.)

1935 **656 (06 (.73)**
Railway Age, No. 26, June 29, p. 1003.
Superintendents (U. S. A. Railroads) **discuss operating problems.** — Part I. (3 300 words.)

1935 **625 .111 (.73)**
Railway Age, No. 26, June 29, p. 1006.
Erie **eliminates 15 grade crossings** at Elmira, N. Y. (5 600 words & fig.)

1935 **625 .151 (.73) & 656 .259 (.73)**
Railway Age, No. 26, June 29, p. 1013.
Spring switch on the Union Pacific eliminates delays. (1 200 words & fig.)

1935 **385. (061.4**
Railway Age, No. 26, June 29, p. 1018.
Members of the MECHANICAL DIVISION (A. A. R.) meet at Chicago. — Fourteenth annual meeting. — Discussions on **safety appliances; electric rolling stock; locomotive and car lighting; specifications for materials; wheels; tank cars; arbitration** Committee; **loading rules, couplers** and **draft gears; lubrication** of cars and locomotives; **labor and materials; locomotive construction; brakes** and **brake equipment.** (36 000 words.)

1935 **621 .133.2 (.73)**
Railway Age, No. 26, June 29, p. 1041.
Air preheater for locomotive fireboxes. (800 words & fig.)

1935 **621 .133.8 (.73)**
Railway Age, No. 26, June 29, p. 1042.
Automatic drifting valve. (500 words & fig.)

1935 **624 (.73)**
Railway Age, No. 1, July 6, p. 3.
Railroads complete **long bridges** over Bonnet Carre floodway. (4 400 words & fig.)

1935 **656 .25 (0**
Railway Age, No. 1, July 6, p. 9.
ANDERSON (B. T.). — **Signaling** as a factor in railway operation. (2 900 words & fig.)

1935 **385 .4 (.73), 621 .139 (.73) & 625 .27 (.73)**
Railway Age, No. 1, July 6, p. 13.
Co-ordinator's report on scrap made public. (**Pooled sorting and dismantling** and the elimination of middle men urged after nation-wide inquiry.) (4 000 words & fig.)

1935 **625 .234 (.73)**
Railway Age, No. 2, July 13, p. 36.
Shriners housed in air-conditioned cars. (900 words & fig.)

1935 **654 (06 (.73) & 656 .254 (06 (.73)**
Railway Age, No. 2, July 13, p. 38.
COMMUNICATION OFFICERS convene. — Annual meeting of **Telegraph and Telephone Section of A. A. R.** held in Chicago. (1 000 words.)

1935 **656 .223.2 (.73)**
Railway Age, No. 2, July 13, p. 40.
KRAMER (Le Roy). — **Private freight cars** serve both railroads and shippers. (3 800 words.)

1935 **62. (01 (06 (.73)**
Railway Age, No. 2, July 13, p. 43.
AMERICAN SOCIETY FOR TESTING MATERIALS discuss **materials** at Detroit meeting. (2 300 words.)

1935 **656 .2 (06 (.73)**
Railway Age, No. 2, July 13, p. 47.
AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS discuss **operating problems.** (4 000 words.)

1935 **625 .111 (.73) & 625 .162 (.73)**
Railway Age, No. 3, July 20, p. 79.
Government issues **rules to cover federal grade crossing work.** (4 700 words.)

1935 **669**
Railway Age, No. 3, July 20, p. 87.
RAGSDALE (E. J. W.). — The **role of metals in the railway industry.** (3 300 words.)

1935 **656 .254 (.73)**
Railway Age, No. 4, July 27, p. 104.
SHEPARD (H. A.) & EVANS (W. C.). — **Ultra short wave radio for carboose to engine communication.** (3 200 words.)

1935 **621 .132.8 (.43)**
Railway Age, No. 4, July 27, p. 107.
German streamlined locomotives attain high speeds. (2 000 words, 1 table & fig.)

1935 **656 .222.5 (.42)**
Railway Age, No. 4, July 27, p. 115.
L. M. S. **stresses on-time performance.** (1 200 words & fig.)

1935 **624. (0 & 669**
Railway Age, No. 4, July 27, p. 117.
WILSON (A. R.). — **Alloy and rust-resisting metals** find increasing sphere **on the railways.** (3 100 words.)

1935 **621 .139 (06 (.73), 625 .18 (06 (.73) & 625 .27 (06 (.73)**
Railway Age, No. 4, July 27, p. 120.
RAILWAY SUPPLY OFFICERS hold convention. — **Proposed coal legislation condemned.** — Discuss Co-ordinator's reports and mandatory action of divisions. (12 500 words.)

1935 **656 .1 (.73)**
Railway Age, No. 4, July 27, p. 129.
Train-connection coaches solve terminal problem. (1 700 words & fig.)

1935 **621 .135.2 (.73)**
Railway Age, No. 5, August 3, p. 145.
Northern Pacific **roller-bearing locomotive overhauled.** (1 200 words, 1 table & fig.)

1935 **385 .52 (.73)**
Railway Age, No. 5, August 3, p. 149.
Effect of depression on employee earnings. (5 700 words.)

1935 **356 .251 (.73) & 656 .256.3 (.73)**
Railway Age, No. 5, August 3, p. 154.
ELSWORTH (R. B.). — **Multiple-block signaling.** (A discussion of **either-direction automatics and an increase in the number of aspects** as means of facilitating train movements and improving safety. (2 400 words & fig.)

1935 **656 .2 (06 (.73)**
Railway Age, No. 5, August 3, p. 157.
SUPERINTENDENTS discuss operating problems. (Committees report on **highway competition** and expediting the **movement of cars through terminals.** (4 800 words.)

1935 **625 .111 (.73) & 625 .162 (.73)**
Railway Age, No. 6, August 10, p. 176.
SURMAN (H. E.). — **Grade separation.** — As the highway engineer sees it. (2 600 words.)

1935 **625 .244 (.73)**
Railway Age, No. 6, August 10, p. 179.
Insulated cars for shipment of dry ice. (900 words.)

1935 **385 .3 (.73) & 385 .4 (.73)**
Railway Age, No. 6, August 10, p. 182.
Reorganization of traffic departments recommended. (5 000 words.)

1935 **621 .132.8 (.73)**
Railway Age, No. 6, August 10, p. 185.
OTTO (C. L.). — **Design for high-speed locomotive.** An industrial designer suggests a treatment of the steam locomotive **for light-weight passenger service.** (1 200 words.)

1935 **347 .763 (.73) & 656 .1 (.73)**
Railway Age, No. 6, August 10, p. 187.
Motor Carrier Bill passed. (2 500 words.)

1935 **656 .256.3**
Railway Age, No. 7, August 17, p. 210.
Coded track-circuit signalling on the Pennsylvania. (2 000 words & fig.)

1935 **621 .132.5 (.73)**
Railway Age, No. 7, August 17, p. 213.
Boston & Maine **4-8-2 locomotives for fast freight.** (1 000 words, 1 table & fig.)

1935 **621 .139 (.73) & 625 .27 (.73)**
Railway Age, No. 7, August 17, p. 214.
Special methods for **dismantling old equipment.** (1 600 words & fig.)

1935 **625 .13 (.73)**
Railway Age, No. 7, August 17, p. 237.
Illinois Central constructs **high-steel viaduct** with Company forces. (1 600 words & fig.)

1935 **625 .162 (.73) & 656 .259 (.73)**
Railway Age, No. 7, August 17, p. 239.
Auto-stop installed on Chicago & North Western. (1 400 words & fig.)

1935 **621 .39 & 621 .43**
Railway Age, No. 7, August 17, p. 243.
CANDEE (A. H.). — Why **electrical transmission ?** (1 700 words & fig.)

1935 **621 .9 (.73), 621 .135.2 (.73) & 625 .214 (.73)**
Railway Age, No. 8, August 24, p. 251.
Great Northern has new « **Dope** » **washing plant.** (1 400 words & fig.)

1935 **656 .261 (.73)**
Railway Age, No. 8, August 24, p. 253.
Santa Fe begins **truck operation.** (700 words & fig.)

1935 **656 .1 (.73)**
Railway Age, No. 8, August 24, p. 255.
D. & R. G. W. expands **bus operations.** (2 200 words & fig.)

1935 **625 .143.3 (.73)**
Railway Age, No. 9, August 31, p. 269.
First published report on joint **investigation of fissured rails.** (4 400 words & fig.)

1935 **656 .223.2 (.73), 656 .225 (.73) & 656 .23 (.73)**
Railway Age, No. 9, August 31, p. 275.
How to **increase freight traffic volume and revenues.** (3 700 words.)

1935 **385 .517.1 (.73)**
Railway Age, No. 9, August 31, p. 278.
Congress enacts **pension tax bill.** (3 800 words.)

1935 **621 .13 (0**
Railway Age, No. 9, August 31, p. 281.
RUSSELL (F.). — **Can the iron horse maintain his stride ?** (3 300 words.)

1935 **656 .254 (.73)**
Railway Age, No. 10, September 7, p. 298.
Centralized traffic control on C. & O. (1 300 words & fig.)

1935 **625 .143.1, 625 .2 (01 & 625 .22**
Railway Age, No. 10, September 7, p. 301.
OTIS (H. A.). — North Shore **reduces truck nosing.** (1 700 words & fig.)

1935 **38 (.73)**
Railway Age, No. 10, September 7, p. 303.
MOULTON (H. G.). — **The need for Companies providing all forms of transportation.** (4 200 words.)

1935 **621 .139 (.73), 625 .18 (.73) & 625 .26 (.73)**
Railway Age, No. 10, September 7, p. 311.
Train crews deliver supplies on Burlington. (1 500 words & fig.)

Railway Engineering and Maintenance. (Chicago.)

1935 **625 .172 (.73)**
Railway Engineering Maintenance, July, p. 394.
Solving the problem of **weed control.** (3 900 words & fig.)

1935 **721 .5**
Railway Engineering Maintenance, July, p. 398.
Roofs — built-up roofing practice. (1 700 words & fig.)

1935 **625 .143.4 (.73)**
Railway Engineering Maintenance, July, p. 400.
Track bolts — can they be standardized ? (4 400 words & fig.)

1935 **625 .142.2 & 691**
Railway Engineering Maintenance, July, p. 405.
KIRKBRIDE (W. H.). — **Recognizing termite infestation.** (700 words & fig.)

1935 **62. (01 & 625 .142.2**
Railway Engineering Maintenance, August, p. 446.
Finding out how long ties will last. (3 800 words & fig.)

1935 **625 .144.4 (.73)**
Railway Engineering Maintenance, August, p. 453.
What ballast discers can do. (Abstract of a report presented by the Committee on Maintenance of Way Work Equipment before the Convention of the American Railway Engineering Association.) (1 200 words & fig.)

1935 **721 .5 (.73)**
Railway Engineering Maintenance, August, p. 454.
Roofs — Constructing a pitch and gravel roof. (2 400 words & fig.)

Railway Gazette. (London.)

1935 **621 .131**
Railway Gazette, No. 4, July 26, p. 139.
DIAMOND (E. L.). — The **horse-power of locomotives — its calculation and measurement — IV.** (3 000 words & fig.)

1935 **656 .225 (.42)**
Railway Gazette, N. 4, July 26, p. 143; No. 5, August 2, p. 189; No. 6, August 9, p. 224; No. 7, August 16, p. 271.
HARTLEY (Sir H.). — **The transport of food by rail.** (8 100 words & tables.) (To be continued.)

1935 **385 (091 (.55)**
Railway Gazette, No. 4, July 26, p. 145.
The Trans-Iranian section, **Iranian** (Pesian) **State Rys.** (2 700 words & fig.)

1935 **385 (093 (.43)**
Railway Gazette, No. 4, July 26, p. 150.
The first public railway in Germany. (2 300 words & fig.)

1935 **625 .17 & 725 .3**
Railway Gazette, No. 5, August 2, p. 187.
HULL (Lt.-Col. H. A.). — **Railway maintenance problems, VIII. — Station buildings.** (1 200 words & fig.)

1935 **388 (.544) & 656 (.944)**
Railway Gazette, No. 5, August 2, p. 193.
ARTHURTON (A. W.). — **Sydney's transport system.** (2 000 words & fig.)

1935 **621 .132.8 (.42) & 621 .135.2 (.42)**
Railway Gazette, No. 5, August 2, p. 197.
The L. M. S. Ry. **turbine locomotive.** (1 200 words & fig.)

1935 **621 .131.3**
Railway Gazette, No. 6, August 9, p. 226.
Locomotive testing. (1 200 words & fig.)

1935 **656 .211.5 (.489)**
Railway Gazette, No. 6, August 9, p. 227.
Danish type of **concrete platform roofing.** (fig.)

1935 **614 (.489)**
Railway Gazette, No. 6, August 9, p. 228.
PYE (W.). — New Danish **method of artificial respiration.** (2 200 words & fig.)

1935 **625 .122 (.54) & 625. 13 (.54)**
Railway Gazette, No. 6, August 9, p. 230.
Engineering works in mud gorge, N. W. Ry., India (500 words & fig.)

1935 **621 .132.3 (.56) & 621 .132.6 (.56)**
Railway Gazette, No. 6, August 9, p. 232.
New **locomotives** for the Palestine Railways. (900 words & fig.)

1935 **621 .133.3**
Railway Gazette, No. 7, August 16, p. 273.
Improving locomotive boiler efficiency. (700 words & fig.)

1935 **625 .234**
Railway Gazette, No. 7, August 16, p. 275.
MIALL (S.). — The **air-conditioning of trains — V.** (1 800 words & fig.)

1935 **625 .232 (.73)**
Railway Gazette, No. 7, August 16, p. 277.
New **steel-covered corridor train,** Great Southern Railways, Ireland. (900 words & fig.)

1935 **621 .132.6 (.64)**
Railway Gazette, No. 7, August 16, p. 279.
Henschel-built **4-8-4 tank engine** for Morocco. (2 000 words & fig.)

1935 **625 .243 (.66)**
Railway Gazette, No. 7, August 16, p. 280.
New **freight train rolling stock** for the Nigerian Railway. (300 words & fig.)

1935 **621 .131.1, 621 .133.1 & 656 .222.1**
Railway Gazette, No. 8, August 23, p. 303.
GRIME (T.). — The **influence of speed on locomotive haulage capacity and fuel consumption.** (1 800 words.)

1935 **625 .232 (.42)**
Railway Gazette, No. 8, August 23, p. 305.
New first class **sleeping cars,** L. M. S. Ry. (1 900 words & fig.)

1935 **621 .94 (.42)**
Railway Gazette, No. 8, August 23, p. 313.
A new heavy-duty **milling machine.** (1 100 words & fig.)

1935 **385. (09 (.42)**
Railway Gazette, No. 9, August 30, p. 336.
The G. W. Ry. centenary : travel in 1835 and 1935. (1 800 words.)

1935 **625 .176 (.518)**
Railway Gazette, No. 9, August 30, p. 337.
Gauge conversion. (1 200 words.)

1935 **656 .261 (.68)**
Railway Gazette, No. 9, August 30, p. 342.
Karriers in South Africa. (600 words & fig.)

1935 **625 .17 (.42)**
Railway Gazette, No. 10, September 6, p. 367.
HULL (Lt.-Col. H. A.). — **Railway maintenance problems, IX. — Mishaps attributable to the permanent way.** (2 000 words & fig.)

1935 **621 .131.1**
Railway Gazette, No. 10, September 6, p. 369.
DIAMOND (E. L.). — **The horse-power of locomotives — Its calculation and measurement — V.** (2 300 words & fig.)

1935 **656 .211.5 (.44)**
Railway Gazette, No. 10, September 6, p. 371.
Mechanical delivery of change. (200 words & fig.)

1935 **625 .176 (.54)**
Railway Gazette, No. 10, September 6, p. 372.
Shoranur-Cochin conversion, South Indian Railway. (1 500 words & fig.)

1935 **625 .616 (.54)**
Railway Gazette, No. 10, September 6, p. 374.
New **metre gauge locomotives** for India. (300 words & fig.)

1935 **656 .256.3 (.42)**
Railway Gazette. No. 10, September 6, p. 377.
Resignalling Manchester Central Station. (2 200 words & fig.)

1935 **621 .133.7 (.42)**
Railway Gazette, No. 10, September 6, p. 380.
Water softening plants for the L. N. E. Ry. (500 words & fig.)

1935 **621 .133.3 & 621 .138**
Railway Gazette. No. 11. September 13, p. 418.
Keeping locomotive boiler tubes clean. (900 words & fig.)

1935 **656 .211 (.42) & 725 .31 (.42)**
Railway Gazette, No. 11, September, 13, p. 419.
New **Southampton Central Station,** Southern Railway. (1 000 words & fig.)

1935 **621 .132.8 (.86)**
Railway Gazette, No. 11, September 13, p. 425.
New **2-8-0 + 0-8-2 Kitson-Meyer locomotives** for South America. (300 words.)

1935 **656 .254 (.42)**
Railway Gazette, No. 11, September 13, p. 425.
General **electric sound amplifiers** at Euston, L. M. S. Ry. (300 words & fig.)

1935 **621 .131.1**
Railway Gazette, No. 12, September 20, p. 446.
DIAMOND (E. L.). — **The horse-power of locomotives — Its calculation and measurement.** (3 400 words & fig.)

1935 **621 .132.8 (.42) & 625 .232 (.42)**
Railway Gazette, No. 12, September 20, p. 451.
New **streamlined locomotive and train,** L. N. E. Ry. (2 900 words & fig.)

1935 **621 .335 (.73) & 621 .43 (.73)**
Diesel Ry. Traction, p. 246, Supplt. of the Ry. Gazette, August 9.
SAWYER (R. T.). — The Alco **diesel-electric locomotive.** (2 000 words, 6 tables & fig.)

1935 **621 .43 (.43)**
Diesel Ry. Traction, p. 250, Supplt. of the Ry. Gazette, August 9.
A **diesel shunter with hydraulic transmission.** (400 words.)

1935 **621 .43 (.42)**
Diesel Ry. Traction, p. 251, Supplt. of the Ry. Gazette, August 9.
More **diesel railcars** for Great Western Ry. (700 words & fig.)

1935 **621 .335 (.54) & 621 .43 (.54)**
Diesel Ry. Traction, p. 252, Supplt. of the Ry. Gazette, August 9.
Heavy locomotives for Indian **mail service.** (800 words & fig.)

1935 **621 .43 (.73)**
Diesel Ry. Traction, p. 254, Supplt. of the Ry. Gazette, August 9.
Diesel sleeping car express in the U. S. A. (1 000 words & fig.)

1935 **621 .335 (.73) & 621 .43 (.73)**
Diesel Ry. Traction, p. 256, Supplt. of the Ry. Gazette, August 9.
Ingersoll-Rand progress in the States. (900 words & fig.)

1935 **621 .43 (.44)**
Diesel Ry. Traction. p. 258. Supplt. of the Ry. Gazette, August 9.
A New French **pneumatic-tyred diesel.** (900 words & fig.)

1935 **621 .43 (.73)**
Diesel Ry. Traction, p. 260, Supplt. to the Ry. Gazette, August 9.
New **diesels for American switching service. — Twin power-unit double-bogie design** of 460 b. h. p. (700 words & fig.)

1935 **621 .43 (62)**
Diesel Ry. Traction. p. 394, Supplt. to the Ry. Gazette, September 6.
Luxury rail travel over desert lines in Egypt. (1 800 words & fig.)

1935 **621 .43 (.44) & 621 .8 (.44)**
Diesel Ry. Traction, p. 400, Supplt. to the Ry. Gazette, September 6.
MIALL (S.). — **Transmissions for diesel locomotives and railcars.** (1 200 words & fig.)

1935 **621 .43 (.44) & 625 .173 (.44)**
Diesel Ry. Traction, p. 401, Supplt. to the Ry. Gazette, September 6.
A new use for diesels. (400 words & fig.)

1935 **621 .43 (.62) & 625 .234 (.62)**
Diesel Ry. Traction, p. 402, Supplt. to the Ry. Gazette, September 6.
The Ganz **air-conditioning system.** (650 words & fig.)

1935 **621 .33 (.436)**
Electric Ry. Traction, p. 166, Supplt. to Ry. Gazette, July 26.
KAAN (E. R.). — **Electrification** of the Tauern section of the Austrian Federal Rys. (1 500 words & fig.)

1935 **621 .336 & 621 .89**
Electric Ry. Traction, p. 170, Supplt. to Ry. Gazette, July 26.
The **lubrication of overhead contact lines.** (1 400 words & fig.)

1935 **621 .33 (.492)**
Electric Ry. Traction. p. 174. Supplt. to Ry. Gazette, July 26.
van LESSEN (H. J.). — Further **electrification** in Holland. (900 words & fig.)

1935 **621 .33 (.68)**
Electric Ry. Traction, p. 326, Supplt. to Ry. Gazette, August 23.
Electrification activity in South Africa. (2 700 words & fig.)

1935 **621 .331**
Electric Ry. Traction, p. 331, Supplt. to Ry. Gazette, August 23.
Rectifiers for regeneration. (1 300 words & fig.)

1935 **621 .336**
Electric Ry. Traction, p. 470, Supplt. to Ry. Gazette, September 20.
HOPKING (A. G.). — The **third rail conductor system** for electric traction. (2 200 words & fig.)

1935 **621 .33 (.44)**
Electric Ry. Traction, p. 473, Supplt. to Ry. Gazette, September 20.
The Paris — Le Mans **electrification.** (900 words & fig.)

1935 **621 .33 & 656 .259**
Electric Ry. Traction, p. 474, Supplt. to Ry. Gazette, September 20.
Protection of telephone and telegraph circuits on a single-phase railway. (1 400 words & fig.)

Railway Magazine. (London.)

1935 **621 .132.3 (.44) & 656 .222.1 (.44)**
Railway Magazine, August, p. 79.
Rebuilt French **express locomotive performance.** — I. — On the **Paris-Orleans Railway.** (2 900 words, tables & fig.)

1935 **621 .33 (.42)**
Railway Magazine, August, p. 101.
The latest Southern Ry. **electrification.** — **Extension** to Lewes, Seaford, Eastbourne and Hastings. (1 600 words & fig.)

1935 **385. (09.1 (.481)**
Railway Magazine, August, p. 109.
The **Railways of Norway.** (4 900 words & fig.)

1935 **656 .222.1 (.42)**
Railway Magazine, September, p. 166.
ALLEN (C. J.). — **British locomotive practice and performance.** (4 800 words, tables & fig.)

1935 **385. (09 (.42)**
Railway Magazine, September, p. 179.
The **centenary of the Great Western Railway.** (2 200 words & fig.)

1935 **385 (09 (.493)**
Railway Magazine, September, p. 189.
LEE (Ch. E.). — The **railways of Belgium.** (3 000 words & fig.)

Railway Mechanical Engineer. (Philadelphia.)

1935 **385.** (061.4
Railway Mechanical Engineer, July, p. 269.
MECHANICAL DIVISION (A. A. R.) holds fourteenth annual meeting, Chicago, June 26 and 27, 1935. — **Electric rolling stock.** — **Car construction.** — **Locomotive and car lighting.** — **Wheels.** — **Tank cars.** — **Locomotive construction.** — **Brakes and brakes equipment.** — **Couplers and draft gears.** — Etc.

1935 **621 .43 (.73)**
Railway Mechanical Engineer, July, p. 306.
Light-weight motor trains for Gulf, Mobile & Northern. (7 900 words & fig.)

1935 **625 .244 (.73)**
Railway Mechanical Engineer, July, p. 316.
Rustless Iron Corporation **light-weight hopper car.** (1 300 words & fig.)

1935 **625 .244 (.73)**
Railway Mechanical Engineer, July, p. 320.
Light-weight hopper car for the Cheasapeake & Ohio. (1 500 words & fig.)

1935 **625 .243 (.73)**
Railway Mechanical Engineer, July, p. 322.
Pullman **welded box car** built without added cost. (2 500 words & fig.)

1935 **625 .243 (.73)**
Railway Mechanical Engineer, July, p. 326.
Light-weight box car built by Mt. Vernon. (600 words, tables & fig.)

1935 **536 & 621 .133**
Railway Mechanical Engineer, August, p. 335.
VINCENT (H. S.). — **Heat transmission in locomotive boilers.** (4 200 words, tables & fig.)

1935 **625 .253 & 625 .254**
Railway Mechanical Engineer, August, p. 341.
STEWART (C. D.). — **Air brakes and entomology.** (2 000 words & fig.)

1935 **621 .135.** (01
Railway Mechanical Engineer, August, p. 344.
Locomotive weight distribution and center of gravity. (2 500 words & fig.)

1935 **625 .26 (.73)**
Railway Mechanical Engineer, August, p. 354.
CEBULLA (F.). — **Progressive car repairs** on the Great Northern. (4 500 words & fig.)

1935 **621 .94 (.73)**
Railway Mechanical Engineer, August, p. 375.
Modern milling machine replaces three obsolete planers. (1 200 words & fig.)

1935 **621 .94 (.73)**
Railway Mechanical Engineer, August, p. 378.
ROBINSON (D.). — Factors which influence **car-wheel turning.** (2 400 words & fig.)

1935 **621 .95 (.73)**
Railway Mechanical Engineer, September, p. 382.
Radial drill cuts time on locomotive parts. (1 100 words & fig.)

1935 **669 .1 & 621 .133.3**
Railway Mechanical Engineer, September, p. 387.
McALLISTER (L. P.). — **Modern materials for high pressure boilers.** (2 500 words & 1 table.)

1935 **621 .132.3 (.73)**
Railway Mechanical Engineer, September, p. 389.
Northern Pacific locomotive 2626 overhauled. (1 300 words & fig.)

1935 **625 .216 (.73) & 625 .26 (.73)**
Railway Mechanical Engineer, September, p. 397.
Repairing hose at Pitcairn. (1 600 words & fig.)

Railway Signaling. (Chicago.)

1935 **656 .25 (.73)**
Railway Signaling, July, p. 353.
Santa Fe **signal repair shop** at San Bernardino, Cal. (1 600 words & fig.)

1935 **656 .258 (.73)**
Railway Signaling, July, p. 356.
Semi-automatic interlocking at a crossing on the Alton. (1 200 words & fig.)

1935 **656 .256 (.73)**
Railway Signaling, July, p. 359.
Reading tests two kinds of **battery standby for crossing signals.** (1 300 words & fig.)

1935 **625 .151 (.73) & 656 .258 (.73)**
Railway Signaling, July, p. 361.
Spring switch on the U. P. (1 600 words & fig.)

1935 **656 .256 (.73)**
Railway Signaling, July, p. 363.
ELSWORTH (R. B.). — **An improved track circuit for light-weight equipment.** (1 500 words & fig.)

1935 **656 .251 (.73)**
Railway Signaling, July, p. 365.
Modern signal aspects on the Boston & Maine. (2 200 words & fig.)

1935 **656 .254 (.73)**
Railway Signaling, July, p. 369.
Centralized traffic control on the Chesapeake & Ohio. (2 500 words & fig.)

1935 **656 .251 & 656 .256.3**
Railway Signaling, August, p. 407.
ELSWORTH (R. B.). — **Multiple-block signaling.** (1 900 words & fig.)

1935 **656 .25 (.73)**
Railway Signaling, August, p. 411.
Signal construction program on the Boston & Maine. **(1 900 words & fig.)**

1935 **656 .25 (.73)**
Railway Signaling, August, p. 417.
New and unusual **signal and relay repair shop** on the Chicago Rapid Transit. (2 000 words & fig.)

1935 **656 .254 (.73 & 656 .258 (.73)**
Railway Signaling, August, p. 420.
Western Indiana installs **all-relay interlocking.** (2 700 words & fig.)

1935 **656 .25 (0 (.73)**
Railway Signaling, August, p. 424.
The Rudd-Rhea **signaling report** of the Pennsylvania. — **Investigation made in 1905 established basis of aspects and fundamental practices.** (6 000 words & fig.)

The Locomotive. (London.)

1935 **621 .43 (.54)**
The Locomotive, August 15, p. 238.
Diesel locomotives for the North Western Ry. of India. (2 000 words & fig.)

1935 **621 .132.3 (.437)**
The Locomotive, August 15, p. 240.
4-8-2 three-cylinder passenger locomotives, Czecho-Slovakian State Railways. (600 words & fig.)

1935 **621 .135.1**
The Locomotive, August 15, p. 254.
SMALL (F. H.). — The use of the **equivalent uniformly distributed load curve for comparing the effects of locomotives on bridges.** (3 700 words & fig.)

1935 **621 .43 (.82)**
The Locomotive, August 15, p. 262.
Railcar for the Entre Rios Ry. (with rubber tyres). (800 words & fig.)

1935 **621 .133.7**
The Locomotive, August 15, p. 264.
Heinl hot water feed system for locomotives. (1 600 words & fig.)

1935 **621 .138**
The Locomotive, September 14, p. 269.
Locomotive availability. (1 200 words & fig.)

1935 **621 .132.5 (.51)**
The Locomotive, September 14, p. 271.
2-8-0 locomotives, Kiangnan Railway, China. (700 words & fig.)

1935 **621 .132.8 (.44)**
The Locomotive, September 14, p. 273.
« Sentinel » steam railcar, Northern Railway of France. (800 words & fig.)

1935 **625 .232 (.42)**
The Locomotive, September 14, p. 278.
New first class **sleeping cars,** L. M. S. Ry. (1 200 words & fig.)

1935 **625 .214 & 656 .221**
The Locomotive, September 14, p. 281.
Starting resistance. (400 words.)

1935 **385 (09 (.43)**
The Locomotive, September 14, p. 282.
The **German Railways centenary.** (2 400 words & fig.)

1935 **385 (09 (.42)**
The Locomotive, September 14, p. 292.
One **hundred years of the G. W. Ry.** (3 800 words.)

1935 **385 (091 (.63)**
The Locomotive, September 14, p. 296.
The **Franco-Ethiopian Railway,** Djibouti to Addis Abeba. (1 000 words & fig.)

1935 **621 .133.7**
The Locomotive, September 14, p. 297.
Heinl hot water feed system for locomotives. (800 words & fig.)

1935 **621 .133.2 & 621 .138.3**
The Locomotive, September 14, p. 300.
Cleaning the superheater flues and boiler tubes. (300 words & fig.)

Transactions, American Society of Mechanical Engineers. (New York.)

1935 **697**
Transactions, Amer. Soc. Mech. Engineers, July, p. 229.
NORRIS (A. M.). — **The psychrograph for air conditioning calculations.** (5 500 words & fig.)

1935 **625 .216 & 625 .222**
Transactions, Amer. Soc. Mech. Engineers, August, p. 317.
WIKANDER (O. R.). — **Draft-gear action in long trains.** (16 000 words & fig.)

1935 **621 .131.1**
Transactions, Amer. Soc. Mech. Engineers, August, p. 335.
Locomotive tractive effort in relation to speed and steam supply. (5 300 words, 4 tables & fig.)

1935 **621 .89**
Transactions, Amer. Soc. Mech. Engineers, August, p. 355.
Current practice in pressures, speeds, clearances and lubrication of oil-film bearings. (Discussion of paper, published as paper M.S.P.-56-2, by H.A.S. Howarth, in the December 1934 issue of the A.S.M.E. Transactions. (12 000 words, tables & fig.)

Transit Journal. (New York.)

1935 **388 (.73) & 621 .33 (.73)**
Transit Journal, August, p. 244.
Rapid Transit brings a suburb near to business. (1 700 words & fig.)

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1935 **621 .392**

Anales de la Asociación de Antiguos Alumnos del I. C. A. I., Agosto, p. 395.

ECHEVARRIA REZOLA (R. de). — Notas sobre **soldadura eléctrica** como elemento de construcción. (Soldadura del acero laminado y forjado.) (4 700 palabras, 1 cuadro & fig.) (Continuará.)

Boletín de la Asociación General de transportes por vía férrea. (Madrid.)

1935 **621 .43 (.460)**

Boletín de la Asociación General de transportes por vía férrea, julio, p. 121. (Suplemento.)

Descripción general de los **automotores** de dos ejes con motor Diesel-Maybach y transmisión mecánica « Mylius » suministrados a la Compañía de los caminos de hierro del Norte de España por M. M. Y. C., antiguos talleres Carde y Escoriaza, Sociedad Anónima. (4 700 palabras & fig.)

Caminos de hierro. (Madrid.)

1935 **656 .231**

Caminos de hierro, agosto, p. 218.

GARCIA DE LA SOTA (A.). — Las **tarifas ferroviarias** en sus aspectos comercial, administrativo y jurídico. (3 000 palabras & fig.) (Continuará.)

Ferrocarriles y Tranvías. (Madrid.)

1935 **621 .132.8**

Ferrocarriles y Tranvías, agosto, p. 226.

REDER (G.). — Las **grandes velocidades** y la tracción a vapor. (1 500 palabras & fig.)

1935 **385**

Ferrocarriles y Tranvías, agosto, p. 228.

ARANGO (L. R.). — Problemas de **economía ferroviaria**. (3 400 palabras.)

Hormigón y Acero. (Madrid.)

1935 **62. (01 & 691**

Hormigón y Acero, agosto, p. 333.

CAMPUS (F.). — Esfuerzos producidos en el **hormigón** a consecuencia de las variaciones de volumen. (2 100 palabras & fig.) (Continuará.)

Ingenieria y Construcción (Madrid).

1935 **388 (.460**

Ingenieria y Construcción, Septiembre, p. 143.

JAMAR (L. L.). — Los **enlaces ferroviarios** de Madrid. (6 900 palabras & fig.)

Los Transportes. (Madrid.)

1935 **656. (.460)**

Los Transportes, N° 405, 1 de agosto, p. 169.

Inspección y vigilancia de los servicios de **transportes por carretera**. (1 300 palabras.)

1935 **656. (.460)**

Los Transportes, N° 405, 1 de agosto, p. 172.

Coordinación de transportes e intervención del Estado en la explotación del camino. (1 300 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1935 **62. (01**

Revista de Obras Públicas, 1° de septiembre, p. 331.

VELASCO DE PANDO (M.). — Solución general del problema de las piezas sometidas a **deformación** plana y construidas sobre cimiento deformable. (1 800 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1935 **691 & 721 .9**

Annali dei lavori pubblici, marzo, p. 177.

Tabelle ed abaco per la verifica delle sezioni rettangolari in **cemento armato** a semplice armatura soggette a flessione semplice. (1 600 parole.)

1935 **624 .2**

Annali dei lavori pubblici, marzo, p. 189.

GUIDI (C.). — Solette in beton armato per **ponti** carreggiabili. (2 000 parole.)

La tecnica professionale. (Firenze.)

1935 **621 .335**

La tecnica professionale, settembre, p. 259.

BONGIOANINI. — Apparecchio alesatore per la rettifica dei cilyndri dei compressori elettrici dei locomotori trifasi. (1 800 parole & fig.)

1935 **621 .133.7**

La tecnica professionale, settembre, p. 272.

MICHELUCCI. — Comportamento pratico in caldaia di **acque** naturali aventi speciali caratteristiche chimiche. (5 200 parole.)

L'Ingegnere. (Roma.)

1935 **624 .6**

L'Ingegnere. settembre, p. 1.

POLSONI (G.). — **L'arco elastico soggetto a forze** normali al suo piano. (2 600 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1935 **656 .25 (0**

Rivista tecnica delle ferrovie italiane. 15 agosto, p. 95.

BALDI (G.). — **Segnalamento ferroviario.** (17 000 parole & fig.)

1935 **656 .222.1**

Rivista tecnica delle ferrovie italiane, 15 agosto, p. 130.

CORBELLINI (G.). — **Velocitá raggiungibili su** rotaie. (6 000 parole, 2 tabelle & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1935 **691 (.92)**

De Ingenieur. Nr 36, 6 September, p. Bt. 68.

SWEYS (H. A.). — **De gewapend betonvoorschriften** voor Nederlandsch-Indië. (1 200 woorden.)

1935 **656**

De Ingenieur, Nr 38, 20 September, p. V. 53.

LOBECK (R.). — Die **Motorisierung** des Verkehrs. (2 600 woorden.)

Spoor- en Tramwegen. (Utrecht.)

1935 **656 (.43)**

Spoor- en Tramwegen, Nr 10, 10 September, p. 435.

De nieuwe duitsche coördinatiewetgeving. (2 500 woorden.)

1935 **385. (06.4 (.493)**

Spoor- en Tramwegen, Nr 10. 10 September, p. 439.

Het verkeerswezen op de **Tentoonstelling te Brussel.** (1 700 woorden & fig.)

1935 **656 .223.2**

Spoor- en Tramwegen, Nr 10, 10 September, p. 444.

STEINKE (F. W.). — **Particuliere wagens.** (2 500 woorden & fig.)

In Polish.

(= 91.885)

Inżynier Kolejowy. (Warszawa.)

1935 **624 = 91 .885**

Inzynier Kolejowy, No. 1, p. 4; No. 2, p. 41.

SZELAGOWSKI. — **The static calculation of arched** aqueducts. (10 350 words & fig.)

1935 **621 .132.6 (.438) = 91 .885**

Inzynier Kolejowy, No. 3, p. 66.

TATARA. — Class OKz 32 **tender locomotive** for passenger trains on **mountain lines,** Polish State Railways. (5 400 words, diagr. & fig.)

1935 **725 .3 = 91 .885**

Inzynier Kolejowy, No. 4, p. 111.

BRANDT. — The use of **hollow concrete bricks** for railway buildings. (2 250 words & fig.)

1935 **621 .89 = 91 .885**

Inzynier Kolejowy, No. 4, p. 114.

KRANC. — The **rational use of lubricating oils.** (1 350 words.)

1935 **656 .225 = 91 .885 & 656 .261 = 91 .885**

Inzynier Kolejowy, No. 5, p. 117.

NIKOLAJEW. — Transport by means of **containers.** (14 400 words & fig.)

1935 **624 .6 = 91 .885**

Inzynier Kolejowy, No. 5, p. 135.

WIERZBICKI. — Note on the **static calculation of (flexible) circular arcs in structures.** (7 200 words & fig.)

1935 **625 .5 = 91 .885**

Inzynier Kolejowy, No. 5, p. 144.

RAABE. — **Telpher lines.** (7 200 words, 1 map & fig.) (To be continued.)

In Rumanian.

(= 599)

Revista tecniča C. F. R. (Bucuresti.)

1935 **385 .587 (.498) = 599**
& 625 .26 (.498) = 599

Revista tecnica C. F. R., No. 4, p. 99.

SCHITEANU. — Work on the **belt system in the carriage and wagon repair shops** of the Rumanian State Railways at Bucharest-Grivitza. (9 1/2 pages & fig.)

In Serbian.

(= 91.882)

Saobračajni Pregled. (Beograd).

1935 **656 .21 (.497.1) = 91 .882**

Saobracajni Pregled, No. 1, p. 5.

MULLER-PETRIC. — Ljubljana as a traffic centre, formerly and at present. (The question of the Ljubljana station.) (3 600 words & fig.)

1935 **385 .587 = 91 .882**

Saobracajni Pregled, No. 1, p. 10.

STEFANOVIC. — **The scientific organisation of labour and its application to railway workshops.** (11 700 words & diagr.)

1935 **625 .164 = 91 .882**

Saobracajni Pregled, No. 2, p. 41.

SINJEOKOV. — **The protection of railway track against snow drifts.** (5 400 words & fig.)

1935 **621 .138.5 (.497.1) = 91 .882**
& 625 .26 (.497.1) = 91 .882

Saobracajni Pregled, No. 2, p. 47.

MILOSEVIC. — **Rationalisation and reorganisation of work in the workshops** of the Jugoslav State Railways. (11 700 words, diagr. & fig.)

1935 **656 .231 (.497.1) = 91 .882**

Saobracajni Pregled, No. 3, p. 86.

CIGOJ. — **Tariff reform** of the 1st March 1935, on the Jugoslav State Railways (passengers, luggage and parcels transport.) (4 950 words.)

1935 **656 .225 = 91 .882**
& 656 .261 = 91 .882

Saobracajni Pregled, No. 4, p. 117.

RISKOV. — **Goods transport in containers transiting over standard and narrow gauge railways.** (6 300 words & fig.)

In Czech.

(= 91.886)

Casopis pro železnični právo a politiku. (Praha.)

1935 **347 .234 (.437) = 91 .886**
& 351 .711.4 (.437) = 91 .886

Casopis pro zelesnicni pravo a politiku, N° 1, p. 1; N° 2, p. 21; N° 3, p. 36.

VONDRUSKA. — **The line of demarkation between the powers of the General Administration of the Country and those of the Railway Administration as regards the authorisations in connection with structures and installations** used for the operation of the railway, as well as structures to be built by private interests on the premises of the railway or in their neighbourhood. (16 400 words.)

1935 **385 .5 (.437) = 91 .886**

Casopis pro zelesnicni pravo a politiku, N° 3, p. 33; N° 4, p. 49.

HORAK. — **Note on the effective force of the staff** on the Czechoslovak State Railways. (7 200 words.)

Zeleznični Revue. (Praha.)

1935 **656 (.437) = 91 .88**

Zeleznicni Revue, N° 3, p. 41.

ZUSTJAK. — **The part played by the goods moto services worked by the Czechoslovak State Railways** (1 050 words.)

Zprávy železničních inženýrů. (Praha.)

1935 **625 .144.2 = 91 .88**
& 656 .222.1 = 91 .88

Zpravy zeleznicnich inzenyru, No. 1, p. 1.

DEYL. — **Speeds limits** on railway curves and **minimum superelevation.** (2 200 words.)

1935 **623 = 91 .88**

Zpravy zeleznicnich inzenyru, No. 2, p. 17.

HAMMERSCHMIED. — **The part played by the railways in the defence of the country.** (2 750 words.)

1935 **625 .142.2 = 91 .88**

Zpravy zeleznicnich inzenyru, No. 3, p. 34; No. 4, p. 56

KRECEK. — **Railway sleepers of second-grade beech** wood. (6 050 words.)

1935 **621 .138.5 (.437) = 91 .88**

Zpravy zeleznicnich inzenyru, No. 4, p. 49; No. 5, p. 72

SOUCEK. — **Mechanical plant at the new locomotive depot at Ceska Trebova.** (16 500 words & fig.)

1935 **625 .5 = 91 .88**

Zpravy zeleznicnich inzenyru, No. 4, p. 59.

NEVRLY. — **The efficiency of telpher lines in relation to their working costs.** (2 750 words & diagr.)

1935 **625 .111 = 91 .886 & 656 .222.1 = 91 .88**

Zpravy zeleznicnich inzenyru, No. 5, p. 69.

DEYL. — **Relocation of railway lines for high-speed traffic.** (3 300 words & fig.)

1935 **623 = 91 .886**

Zpravy zeleznicnich inzenyru, No. 5, p. 81.

FIALA. — **The influence on the means of transport of the steps taken to ensure the defence of the country.** (2 200 words.)

M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS [1].

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General Secretary of the Permanent Commission of the International Railway Congress Association.

(DECEMBER 1935)

[016. 385. (02]

I. — BOOKS.

In French.

1935 62. (01

OREYFUSS (E.).

Leçons sur la résistance des matériaux.

Paris, Léon Eyrolles. 1 volume, 758 pages. (Prix : 0 francs français.)

1935 621 .135. (01

ROCARD (Y.).

La stabilité de route des locomotives.

Paris, Hermann & Cie. 1 volume, 66 pages. (Prix : 5 francs français.)

In German.

1935 621 .13 (02

Benennung der Lokomotivteile.

Berlin, Beuth-Verlag. 1 Band. (Preis : 2 R.M.)

1935 624 .6

ERNHARD (F.).

Theorie und Berechnung vollwandiger Bogenträger.

Berlin, Julius Springer. 1 Band, 143 Seiten und 75 Abbildungen. (Preis : 12 R.M.)

1935 62. (01 & 621 .392

Dauerfestigkeitsversuche mit Schweissverbindungen.

Berlin (N. W. 7), V-D-I. Verlag. 1 Band. (Preis : 50 R.M.)

1935 621 .114

WEIS (M.).

Reibungs- und Undichtigkeitsverluste an Kolbenringen.

Berlin, V.-D.-I Verlag. 1 Band, 23 Seiten. (Preis : R.M.)

1934 62 (01

HUM (A.) & WUNDERLICH (F.).

Dauerbiegefestigkeit von Konstruktionsteilen an Einspannungen, Nabensitzen und ähnlichen Kraftangriffstellen.

Berlin, V.-D.-I. Verlag. 1 Band, 82 Seiten, 94 Abbildungen und 10 Zahlentafeln. (Preis : 7.50 R.M.)

1935 625 .13

WEGELE (H.).

Tunnelbau.

Berlin & Leipzig, Walter de Gruyter & C°. 1 Band, 139 Seiten und 98 Abbildungen. (Preis : 1.62 R.M.)

1935 621 .131.1

WOLFGANG LÜBSEN.

Die Verbesserung der Wirtschaftlichkeit der Dampflokomotive durch konstruktive Massnahmen zur Senkung des Brennstoffverbrauchs.

Berlin (N. W. 7), Hirschwaldsche Buchhandlung, Unter den Linden, 68. 1 Band, 104 Seiten und 25 Textabbildungen. (Preis : 7.50 R.M.)

In English.

1935 621 .133.4 & 621 .134.5

A supplementary study of the locomotive front-end.

Urbana (Ill.). University of Illinois Engineering Experiment Station. Bulletin No. 274. 40 pages (9 × 6 inches). (Price : 50 cents.)

1935 691 (.54) & 694 (.54)

CRIPS VILLIERS (A. W.), B. A., B. A. I., assistant engineer, Bombay, Baroda & Central India Ry.

Controlled concrete.

Delhi. The Manager of Publications. Technical paper No. 291. (Price : As. 5 or 6 d.)

1935 385 (08 (.91)

FEDERATED MALAY STATES.

Railways report for the year 1934, by D. H. ELIAS, M. C., General Manager, F. M. S. Rys.

Kuala Lumpur. Federated Malay States Government Press. 85 pages, tables and a map.

1935 385. (08 (.66)

GOLD COAST RAILWAY AND HARBOUR.

Administration report for the year 1934-35.

Accra (Gold Coast). Government Printing Department. 100 pages.

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1935 **621 .43 & 656 .2**

LIPETZ (A. I.), consulting engineer, American Locomotive Company.

Diesel engine potentialities and possibilities in rail transportation.

Lafayette (Indiana). Purdue University. Research Bulletin No. 49, Engineering Experiment Station. March 1935. 47 pages. (Price : 25 cents.)

1935 **621 .13 (02**

Locomotive Engineers' Pocket Book, 1935.

London, E. C. 4. The Locomotive Publishing Co. Ltd., Amen Corner, Paternoster Row. (6 1/2 × 3 3/4 inches), 400 pages, illust. (Price : 3 sh. 6 d. net.)

1935 **624 & 721 .**

Steel and concrete structures. — A.R.E.A. manual. Chicago. Published by the American Railway Engineering Association. 59, E. Van Buren Street. (6 × 9 inches.) 258 pages. (Price : $ 1.00.)

In Italian.

1935 **624 .**

PUGNO (G. M.)

Lezioni sulla scienza delle costruzioni. Le trav inflesse. Volume I-II.

Bologna, Libreria internazionale L. Cappelli. 1 volume, 214 pagine e tavole. (Prezzo : 60 Lire.)

[016. 385. (05]

II. — PERIODICALS.

In French.

Bulletin des transports internationaux par chemins de fer. (Berne.)

1935 **656 .227 (.45)**

Bull. des transp. intern. par ch. de fer, septembre, p. 360.

Le nouveau Règlement italien pour le **transport par chemins de fer des matières dangereuses et nuisibles,** mis en regard de l'Annexe 1 à la C. I. M. (3 200 mots.)

1935 **313 .385 (.439)**

Bull. des transp. intern. par ch. de fer, septembre, p. 388.

Statistique des Chemins de fer royaux de l'Etat hongrois pour l'exercice 1933/34. (700 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1935 **621 .13, 621 .335 & 621 .43**

Bull. techn. de la Suisse romande, N° 21, 12 octobre, p. 241.

KUMMER (W.). — Etude comparative des **moteurs de traction actuels.** (1 100 mots & fig.) (A suivre.)

1935 **621 .13, 621 .335 & 621 .43**

Bull. techn. de la Suisse romande, N° 22, 26 octobre, p. 253.

KUMMER (W.). — Etude comparative des **moteurs de traction actuels.** (1 100 mots & fig.)

Bulletin technique de l'Union professionnelle des Inspecteurs techniques et des chefs de section des chemins de fer belges. (Bruxelles.)

1935 **656 .253**

Bull. techn. de l'Union profess. des Inspecteurs techn et des Chefs de section des Ch. de fer belges, N° 58 15 septembre, p. 2.

BANEUX (G.). — L'économie dans l'**éclairage des signaux.** (3 200 mots & fig.)

1935 **625 .113 (.494)**

Bull. techn. de l'Union profess. des Inspecteurs techn et des Chefs de section des Ch. de fer belges, N° 58 15 septembre, p. 22.

Les « **plans inclinés** » de Liége. (1 500 mots & fig.)

Chronique des transports. (Paris.)

1935 **385 .113 (.44)**

Chronique des transports, N° 18, 25 septembre, p. 3

Les **Chemins de fer d'Alsace et de Lorraine** en 1934 (3 000 mots.)

1935 **656 .234 (.44)**

Chronique des transports, N° 19, 10 octobre, p. 3.

La nouvelle **tarification des voyageurs.** (3 000 mots.)

Electricité. (Paris.)

1935 **621 .33 (.43)**

Electricité, septembre, p. 411.

La mise en service de la **traction électrique** sur la ligne Augsbourg-Nüremberg. (1 200 mots & fig.)

1935 **621 .116 (.437)**

Electricité, septembre, p. 412.

Une importante application des **chaudières Löffler** à la centrale de Trébovice (Tchécoslovaquie). (2 000 mots & fig.)

Génie civil. (Paris.)

1935 **62.** (01

Génie civil, N° 2771, 21 septembre, p. 266.

MULS-GUINOTTE (F.). — Les propriétés analytiques des **lignes d'influence.** Etude systématique de leurs dérivées. (3 000 mots & fig.)

1935 **621 .116**

Génie civil, N° 2771, 21 septembre, p. 276.

BLENKINSOP (T. S.). — Les particularités de l'emploi des **chaudières à très haute pression,** système Löffler. (1 600 mots & fig.)

1935 **621 .92**

Génie civil, N° 2772. 28 septembre, p. 285.

ANTONI (A.). — Les **machines à roder et à polir** les surfaces métalliques après usinage. (4 600 mots & fig.)

1935 **621 .392**

Génie civil. N° 2772. 28 septembre, p. 290.

DUTILLEUL & TATON. — Les centrales de **soudure électrique.** (4 600 mots & fig.)

1935 **624 .32 (.489)**

Génie civil, N° 2773, 5 octobre, p. 309.

Le **pont métallique** sur le Petit-Belt, entre le Jutland et l'île de Fionie (Danemark). (3 000 mots & fig.)

1935 **691**

Génie civil, N° 2775, 19 octobre, p. 366.

TREVES (E.). — Le **béton vibré.** Considérations sur les différents modes de vibration. (5 600 mots & fig.)

1935 **656 .254 (.44)**

Génie civil, N° 2775, 19 octobre, p. 376.

Les **applications de la T. S. F.** au port de Rouen, sur le réseau des Chemins de fer de l'Etat. (1 000 mots.)

1935 **621 .331 (.44)**

Génie civil, N° 2776, 26 octobre, p. 385.

BIDAULT DES CHAUMES (A.). — Le barrage et la **centrale électrique** de Marèges. (7 600 mots & fig.)

1935 **621 .91**

Génie civil, N° 2776, 26 octobre, p. 401.

ANTONI (A.). — La **machine à rectifier** intérieurement sans cendres, système Heald. (1 900 mots & fig.)

L'Allègement dans les Transports. (Lucerne.)

1935 **625 .2**

L'Allègement dans les transports, septembre-octobre, p. 115.

GOICOECHEA (A.). — **El aligeramiento en los ferrocarriles de vía de 1 metro.** (1 900 palabras & fig.) (Continua.)

1935 **625 .2 & 669**

L'Allègement dans les transports, septembre-octobre, p. 120.

DUMAS (A.). — **L'aluminium dans le matériel roulant.** (2 800 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1935 **621 .33 (.44)**

Les Chemins de fer et les Tramways, octobre, p. 255.

L'électrification de la ligne Montauban-Sète. (2 700 mots & fig.)

1935 **656 .254**

Les Chemins de fer et les Tramways, octobre, p. 265.

Le « **Block rail-route** » Moutier, système de signalisation pour passages à niveau. (6 700 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1935 **621 .43**

L'Ind. des voies ferrées et des transp. autom., septembre, p. 228.

ZENS (P.). — **Automotrices** pour voie de 1 mètre. (3 000 mots & fig.)

L'Ingénieur-Constructeur. (Paris.)

1935 **625 .113**

L'Ingénieur-Constructeur, septembre-octobre, p, 3569.

MALEGARIE (Ch.) & BIZE (J.). — Application des **raccordements progressifs** aux sinuosités des voies terrestres et fluviales. (3 000 mots & tables.)

1935 **624 .2**

L'Ingénieur-Constructeur, septembre-octobre, p. 3599.

LAHITÈTE (J.). — **Travée droite encastrée.** Moments provoqués par une charge uniformément répartie. (600 mots & fig.)

L'Ossature métallique. (Bruxelles.)

1935 **624 .32 (.492)**

L'Ossature métallique, septembre, p. 476.

Le **pont** de Nuth (Hollande). (600 mots & fig.)

1935 **624 .2**

L'Ossature métallique, septembre, p. 480.

BRYLA (S.). — Influence des **raidisseurs soudés** aux âmes des poutrelles sur la résistance à la flexion. (3 000 mots, 7 tableaux & fig.)

1935 **621 .392 (.439) & 624 .92 (.439)**

L'Ossature métallique, octobre, p. 541.

ENYEDI (B.). — Prescriptions officielles hongroises sur les **constructions métalliques soudées.** (2 000 mots, 1 tableau & fig.)

Revue générale des chemins de fer. (Paris.)

1935 **621 .43 (.44)**

Revue générale des chemins de fer, octobre, p. 205.

NICOLET. — Les **automotrices** des Chemins de fer de l'Etat. (5 000 mots & fig.)

1935 **385 (.44)**
Revue générale des chemins de fer, octobre, p. 218.
Rapport du Ministre des Travaux Publics au Président du Conseil sur l'**évolution des chemins de fer** au cours de l'année 1934. (14 000 mots.)

1935 **385. (01 (.55)**
Revue générale des chemins de fer, octobre, p. 253.
Le **Transiranien.** (700 mots & fig.)

1935 **625 .163**
Revue générale des chemins de fer, octobre, p. 254.
La protection des chemins de fer en pays de montagne contre les **éboulements et les avalanches.** (2 000 mots & fig.)

1935 **656 .25 (.43)**
Revue générale des chemins de fer, octobre, p. 258.
Le nouveau **règlement des signaux** de la Reichsbahn. (4 200 mots & fig.)

In German.

Die Lokomotive. (Wien.)

1934 **621 .335 (.436)**
Die Lokomotive, Heft 9, September, S. 157.
Bo-Bo Elektro-Einheitslokomotive Reihe 1170.200 der Österreichischen Bundesbahnen. (1 500 Wörter & Abb.)

1935 **621 .33 (.439)**
Die Lokomotive, Heft 9, September, S. 173.
Die Eröffnung des **elektrischen Betriebes** auf der Strecke Budapest-Hegyeshalom. (800 Wörter.)

1935 **621 .132.3 (.73)**
Die Lokomotive, Heft 10, Oktober, S. 177.
Die neuen **Rekord-Schnellzugslokomotiven** der Baltimore und Ohio-Bahn. (1 400 Wörter & Abb.)

1935 **385. (06.4 (.43)**
Die Lokomotive, Heft 10, Oktober, S. 180.
AMMER (J.). — Die **Reichsbahn-Ausstellung** in Nürnberg. (2 600 Wörter & Abb.)

Elektrische Bahnen. (Berlin.)

1935 **621 .33 (.43) & 656 .251 (.43)**
Elektrische Bahnen, August, S. 213.
SCHIEB. — Die **Signale für den elektrischen Zugbetrieb** im neuen Signalbuch. (2 200 Wörter & Abb.)

1935 **656 .254**
Elektrische Bahnen, August, S. 216.
STEINER (F.). — Die **selbsttätige Zugsicherung,** System « Signum ». (3 600 Wörter & Abb.)

1935 **621 .33 (.43)**
Elektrische Bahnen, August, S. 222.
KOTHER. — Die neuere Entwicklung **der elektrischen Zugförderung** im Rahmen der deutschen Energiewirtschaft. (3 600 Wörter, 4 Tafeln & Abb.)

1935 **656 .25**
Elektrische Bahnen, August, S. 231.
REHSCHUH (G.). — **Selbsttätige Warnanlagen an Wegübergängen in Schienenhöhe.** (2 300 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1935 **621 .132.8 (.52)**
Glasers Annalen, Heft 6, 15. September, S. 48.
WERNEKKE. — Ein **Stromlinienzug** im fernen Osten. (1 900 Wörter & Abb.)

1935 **624 .2**
Glasers Annalen, Heft 7, 1. Oktober, S. 55.
SONNTAG (R.). — **Schubspannungen in keiligen Balken.** (3 100 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1935 **621 .43 (.436)**
Organ für die Fortschr. des Eisenbahnwesens, Heft 18, 15. September, S. 351.
LEHNER (A.). — Neuere **dieselelektrische Triebwagen** der Österreichischen Bundesbahnen. (5 800 Wörter & Abb.)

1935 **621 .43**
Organ für die Fortschr. des Eisenbahnwesens, Heft 18, 15. September, S. 359.
INDRA (O.). — Die neueste Entwicklung der **dieselelektrischen Stromlinien-Gliederzüge** in den Vereinigten Staaten von Amerika. (2 300 Wörter & Abb.)

1935 **621 .132.8**
Organ für die Fortschr. des Eisenbahnwesens, Heft 18, 15. September, S. 362.
DANNECKER (R.). — **Stromlinien-Dampflokomotiven und Züge.** (2 700 Wörter & Abb.)

1935 **656 .212.5**
Organ für die Fortschr. des Eisenbahnwesens, Heft 19, 1. Oktober, S. 375.
WERNER (P.). — Die **rangierdienstliche Behandlung der Eisenbahnwagen.** (3 200 Wörter & Abb.)

1935 **625 .151**
Organ für die Fortschr. des Eisenbahnwesens, Heft 19, 1. Oktober, S. 379.
HÖFER. — **Bogenweichen** in neuer Beleuchtung. (3 300 Wörter & Abb.)

1935 **656 .256.3**
Organ für die Fortschr. des Eisenbahnwesens, Heft 19, 1. Oktober, S. 386.
MEYER (K.). — Das **isolierte Gleis** im selbsttätigen Streckenblock. (1 500 Wörter & Abb.)

1935 **625 .14**
Organ für die Fortschr. des Eisenbahnwesens, Heft 19, 1. Oktober, S. 388.
MANDEL (G.). — Erfahrungen mit dem **Blattfederoberbau nach Rüping.** (2 800 Wörter & Abb.)

1935 **621 .132.8, 625 .2 & 656 .221**
Organ für die Fortschr. des Eisenbahnwesens, Heft 20, 15. Oktober, S. 395.
NORDMANN. — Der **Luftwiderstand** der Eisenbahnfahrzeuge. (7 500 Wörter & Abb.)

1935 **621 .133.3**
Organ für die Fortschr. des Eisenbahnwesens, Heft 20, 15. Oktober, S. 405.
POSTUPALSKY (N.). — Die Gesetze des **Wärmeübergangs im Lokomotivlangkessel.** (5 300 Wörter & Abb.)

Reichsbahn. (Berlin.)

1935 **385 .113 (.43)**
Reichsbahn, Nr. 1, S. 7.
Die **Deutsche Reichsbahn** im Jahre 1934. (38 Seiten.)

1935 **656 (.43)**
Reichsbahn, Nr. 2, S. 73.
LAMP. — Die **Reichs-Strassenverkehrs-Ordnung** und ihre Beziehungen zu den Eisenbahnen. (6 Seiten.)

1935 **625 .13 (.43)**
Reichsbahn, Nr. 4, S. 126.
GRETZSCHEL. — Die **Abgrabung des oberauer Tunnels** bei Km. 93 der Linie Leipzig-Dresden. (6 Seiten & Abb.)

1935 **656 .261 (.43)**
Reichsbahn, Nr. 7, S. 212.
CULEMEYER. — Die neuere Entwicklung der **Strassenfahrzeuge für Eisenbahnen** und ihrer Hilfsvorrichtungen. (13 Seiten & Abb.)

1935 **656 .261 (.43)**
Reichsbahn, Nr. 7, S. 225.
LAUTERBACH. — 6 000 Eisenbahnwagen rollen über das Pflaster. (9 Seiten & Abb.)

1935 **621 .132.8 (.43)**
Reichsbahn, Nr. 10, S. 322.
FUCHS — Die **schnellste Dampflokomotive der Welt.** Die neue 2-0-2 Schnellzuglokomotive der Reichsbahn mit Stromlinienverkleidung und mit fünfachsigem Tender. (8 Seiten, 1 Tafel & Abb.)

1935 **313 : 621 .138.5 (.43) & 313 : 625 .26**
Reichsbahn, Nr. 12, S. 373.
SILBEREISEN. — Die Anwendung der Grosszahlforschung für die Auswertung der **Werkstättenstatistik** der Deutschen Reichsbahn. (4 Seiten & Diagr.)

1935 **621 .132.8 (.43)**
Reichsbahn, Nr. 15, S. 460.
MAUCK. — **Neue Formen des Dampfantriebes.** Dampfmotorzug der **Lübeck-Büchener Eisenbahn-Gesellschaft.** (3 Seiten, Diagr. & Abb.)

1935 **656 .225 (.43)**
Reichsbahn, Nr. 15, S. 462.
MEYER. — Der **Güterverkehr** der Reichsbahn auf neuen Wegen. Einsatz des Lastkraftwagen im Güterverkehr der Reichsbahn. (3 Seiten, Diagr. & Abb.)

1935 **621 .33 (.43)**
Reichsbahn, Nr. 19, S. 549.
NADERER. — Die **Elektrisierung** der Strecke Augsburg-Nürnberg. (8 Seiten & Abb.)

1935 **621 .43 (.43)**
Reichsbahn, Nr. 20, S. 572.
STROEBE. — Neue **Dieselelektrische Schnelltriebwagen** der Deutschen Reichsbahn. (4 Seiten & Abb.)

1935 **656 .224 (.43) & 656 .211.5 (.43)**
Reichsbahn, Nr. 22, S. 628.
KLUGE. — **Beschleunigung des Ladegeschäftes** bei den Personen, Eil- und Schnellzügen. (2 Seiten & Abb.)

Verkehrstechnische Woche. (Berlin.)

1935 **625 .26 (.43)**
Verkehrstechnische Woche, Nr. 1, S. 1.
KUEHNE. — Die Aufgaben der **Fahrzeug-Erhaltungswirtschaft der Deutschen Reichsbahn.** Vortrag in der 11. Eisenbahnwissenschaftlichen Woche der Verwaltungsakademie. (8 Seiten.)

1935 **621 .33**
Verkehrstechnische Woche, Nr. 4, S. 41; Nr. 5, S. 58; Nr. 6, S. 71.
UNGER. — Die **zweckmässigste Stromart** der elektrischen Vollbahnen. (17 Seiten & Abb.)

1935 **656 .212**
Verkehrstechnische Woche, Nr. 10-11, S. 129.
PIRATH. — Grundsätzliches über den **einseitigen Verschiebebahnhof.** (5 Seiten.)

1935 **656 .212.5**
Verkehrstechnische Woche, Nr. 10-11, S. 134.
WENTZEL. — Über Wert und Entbehrlichkeit des **Umfahrgleises neben Ablaufbergen.** (8 Seiten.)

1935 **656 .257**
Verkehrstechnische Woche, Nr. 10-11, S. 148.
WAGNER. — Das **Vierreihenstellwerk.** (12 Seiten & Abb.)

1935 **656 .212.5 (.4)**
Verkehrstechnische Woche, Nr. 10-11, S. 160.
WENZEL. — **Rangiertechnik** im europäischen Ausland. (13 Seiten & Abb.)

1935 **625 .23 (0**
Verkehrstechnische Woche, Nr. 12, S. 173.
WIENS. — **Neuerungen im Personenwagenbau** unter besonderer Berücksichtigung der Verbesserung der Reisebequemlichkeit. (8 Seiten & Abb.)

1935 **621 .43 (.43)**
Verkehrstechnische Woche, Nr. 14, S. 197.
STROEBE. — Fortschritte im **Triebwagenbau** bei der Deutschen Reichsbahn. (11 Seiten & Abb.)

1935 **656 .254 (.43)**
Verkehrstechnische Woche, Nr. 17, S. 237; Nr. 18, S. .

KRAUSKOPF. — Die Entwicklung und der Stand der **Zugbeeinflussung** bei der Deutschen Reichsbahn. (14 Seiten & Abb.) (Fortsetzung folgt.)

1935 **625 .113**
Verkehrstechnische Woche, Nr. 21, S. 287.

SCHRAMM. — **Kurvenband und Krümmungslinie bei Höhenplänen** und Streckenübersichtsplänen von Strassen und Eisenbahnen. (3 Seiten.)

1935 **388 (.42 + .73)**
Verkehrstechnische Woche, Nr. 22, S. 303; Nr. 23, S. 319; Nr. 24, S. 333.

MATTERSDORF. — Versuche und Verbesserungen sowie heutiger Stand der Grundsätze für den Bau bei den **Schnellbahnen** von New York und London. (17 Seiten & Abb.)

1935 **621 .132.1 (.43)**
Verkehrstechnische Woche, Nr. 23, S. 313; Nr. 24, S. 327; Nr. 25, S. 343.

WAGNER. — Neue **Dampflokomotiven** der Deutschen Reichsbahn. (18 Seiten & Abb.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1935 **621 .82**
Zeitsch. des Ver. deutsch. Ing., Nr. 38, 21. September, S. 1131.

OSTERMANN (W.). — Deutsche Technik und Rohstoffwirtschaft. Kunstharz-Presstoff für **Gleitlager.** (4 000 Wörter & Abb.)

1935 **385. (09.3 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1213.

REMY (K.). — Ideenwandel und Persönlichkeit in der deutschen **Eisenbahngeschichte.** (15 000 Wörter.)

1935 **656 .21**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1224.

BLUM (O.). — Neuzeitliche **Bahnhofsanlagen.** (1 200 Wörter.)

1935 **621 .131.3 & 621 .132.8**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1226.

NORDMANN (H.). — Versuchsergebnisse mit **Stromlinien-Dampflokomotiven.** (3 600 Wörter & Abb.)

1935 **621 .43 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1229.

FUCHS (Fr.) & GRASSE (R.). — **1 400 P.S.-Diesellokomotive** der Deutschen Reichsbahn mit Flüssigkeitsgetriebe. (2 500 Wörter & Abb.)

1935 **621 .335 (.43**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1233.

GANZENMÜLLER (A.). — Die **elektrischen Trieb fahrzeuge** der deutschen Reichsbahn. (4 200 Wörter Abb.)

1935 **621 .392 & 625 .2**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1237.

SCHINKE (J.). — Die Anwendung der **Schweissun im Güterwagenbau.** (2 200 Wörter & Abb.)

1935 **621 .392 (.43) & 625 .23 (.43**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1241.

BODEN (Fr.). — **Neuerungen im Personenwagenba** der Deutschen Reichsbahn. (2 300 Wörter & Abb.)

1935 **625 .25**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1244.

RECKEL (Fr.). — **Verbesserungen an der Klotz bremse** für schnellfahrende Eisenbahnfahrzeuge. (3 80 Wörter & Abb.)

1935 **625 .258 (.43**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1249.

GOTTSCHALK (P.). — Neuere **Gleisbremsen** de Deutschen Reichsbahn. (2 600 Wörter & Abb.)

1935 **625 .451 (.43**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1252.

HARTMANN (F.). — Die **Weichen** der Deutsche Reichsbahn. (2 200 Wörter & Abb.)

1935 **69**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1254.

SCHAECHTERIE (K.). — **Holz im Eisenbahnbau** Brücken, Hallen und Dächer. (700 Wörter & Abb.)

1935 **656 .261 (.43**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1256.

CULEMEYER (H.). — Der **Kraftwagen im Diens der Reichsbahn.** (4 300 Wörter & Abb.)

1935 **624 .32 (.43**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1261.

ERNST (E.) & WOLFF (L.). — **Stählerne Brücke** für Reichskraftfahrbahnen. (2 400 Wörter & Abb.)

1935 **621 .392 (.43) & 624 (.43**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktobe S. 1264.

DÖMEN (A.). — **Geschweisste Stahlbrücken** de Deutschen Reichsbahn. (2 000 Wörter & Abb.)

1935 **621 .139 (.43), 625 .18 (.43) & 625 .27 (.43)**
Zeitsch. des Ver. deutsch. Ing., Nr. 41, 12. Oktober, S. 1268.
EMMELIUS (C.). — Das **Beschaffungswesen** bei der Deutschen Reichsbahn. (3 000 Wörter & Abb.)

1935 **621 .43**
Zeitsch. des Ver. deutsch. Ing., Nr. 42, 19 Oktober, S. 1283.
KURT (F.). — **Flüssigkeitsgetriebe für Triebwagen** mit Verbrennungsmotoren. (3 600 Wörter & Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

1935 **656 .259**
Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 13, 10. Oktober, S. 149.
DIEHL (H.). — Die **Achszähleinrichtungen** im Eisenbahnbetrieb. (4 200 Wörter & Abb.) (Fortsetzung folgt.)

1935 **656 .254 (.43**
Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 13, 10. Oktober, S. 154.
LÜTGERT. — Die **selbsttätigen Warnanlagen** an Wegübergängen bei der Deutschen Reichsbahn. (3 400 Wörter & Abb.)

Zeitung des Vereins mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1935 **656 .1 (.43)**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 40. 3. Oktober, S. 837.
Die **Autobahnbetriebs- und Verkehrsordnung.** (900 Wörter.)

1935 **385 .113 (.492)**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Heft 40. 3. Oktober, S. 838.
Die **Niederländischen Eisenbahnen** im Jahre 1934. (5 000 Wörter.)

1935 **385 (.42)**
Zeitung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 43, 24. Oktober, S. 901.
MEYER. — Das **Eisenbahngesetz von 1921** in seiner Auswirkung auf die « London Midland & Scottish Railway » in England. (6 000 Wörter.) (Schluss folgt.)

In English.

Bulletin, American Railway Engineering Association. (Chicago, Ill.)

1935 **625 .143.3 (.73)**
Bull., American Ry. Engineer. Association, June, p. 1.
MOORE (H. F.). — Progress report of the joint investigation of **fissures in railroad rails.** (11 000 words & fig.)

1935 **625 .142 (.73)**
Bull., American Ry. Engineer. Association, June, p. 27.
Preliminary report of Committee III — **Ties.** (Tables.)

1935 **625 .1 (06 (.73)**
Bull., American Ry. Engineer. Association, June, p. 29.
Address of President John E. ARMSTRONG delivered at the 36th annual meeting. (2 000 words.)

1935 **625 .1 (06 (.73)**
Bull., American Ry. Engineer. Association, June, p. 32.
Address of M. J. Gormley, Executive Assistant, Association of American Railroads. (1 500 words.)

1935 **624 (.73)**
Bull., American Ry. Engineer. Association, June, p. 34.
Abstract from discussion on **iron and steel structures.** (10 500 words.)

1935 **624 (.73)**
Bull., American Ry. Engineer. Association, June, p. 49.
Abstract from discussion on **wooden bridges and trestles.** (1 700 words.)

1935 **614 (.73)**
Bull., American Ry. Engineer. Association, June, p. 51.
Abstract from discussion on **water service, fire protection and sanitation.** (1 700 words.)

1935 **625 .14 (.73)**
Bull., American Ry. Engineer. Association, June, p. 54.
Abstract from discussion on **track.** (Elevation of curves.) (6 700 words.)

Engineer. (London.)

1935 **621 .39 & 621 .8**
Engineer, No. 4159, September 27, p. 310.
Electric driving. No. VI. (7 000 words & fig.)

1935 **62. (06 (.42)**
Engineer, No. 4159, September 27, p. 313.
The British Association. — No. III. **Science and road traffic.** (6 000 words.)

1935 **62. (064 (.42)**
Engineer, No. 4159, September 27, p. 314; No. 4160, October 4, p. 344; No. 4161, October 11, p. 370.
The Shipping, Engineering and Machinery Exhibition at Olympia, London. (20 000 words & fig.)

1935 **621 .132.8 (.42) & 625 .232 (.42)**
Engineer, No. 4159, September 27, p. 318.
L. and N. E. R. — « **The Silver Jubilee** » **train.** (3 500 words, 1 table & fig.)

1935 **669 .1 (06 (.42)**
Engineer, No. 4159, September 27, p. 324.
The Iron and Steel Institute. — No. II. Sixth report on the heterogeneity of **steel ingots.** (Discussion). — Fatigue of patended **steel wires.** (Discussion.) (4 400 words.)

1935 **669 (06 (.42)**
Engineer, No. 4159, September 27, p. 330.
Institute of Metals. — No. III. Metal losses in melting **copper alloys.** — **Some special bronzes.** — Age heardening of **nickel-silicon copper alloys.** (Discussions.) (5 200 words.)

1935 **669. (06 (.42)**
Engineer, No. 4160, October 4, p. 342.
Institute of Metals. — No. IV. **Creep under pure flexure.** — **Elongation of lead. Corrosion of magnesium. Magnesium alloys and corrosion.** (Abstracts of papers and discussions.) (5 500 words.)

1935 **621 .132.8 (.42) & 656 .222.1 (.42)**
Engineer, No. 4160, October 4, p. 348.
L. N. E. R. « **Silver Jubilee** » **train.** (2 000 words, 1 table & fig.)

1935 **656 .222.1**
Engineer, No. 4160, October 4, p. 351.
High speed on the rail. (1 800 words.)

1935 **536 (06**
Engineer, No. 4160, October 4, p. 352.
The Third International Steam Tables Conference. (1 700 words & tables.)

1935 **669 .1 (06 (.42)**
Engineer, No. 4160, October 4, p. 354.
The Iron and Steel Institute. — No. III. **Streamline flow in metals. Waste-heat boilers in open-hearth practice.** (Abstracts of papers and discussions.) (5 500 words & fig.)

1935 **621 .94 (.42)**
Engineer, No. 4160, October 4, p. 356.
78 in. **railway wheel lathe.** (600 words & fig.)

1935 **62 (06 (.42)**
Engineer, No. 4161, October 11, p. 382.
The British Association. — No. IV. **Lubrication.** (Discussion.) (5 300 words.)

Engineering. (London.)

1935 **62 (064 (.42)**
Engineering, No. 3637, September 27, p. 323.
Shipping, Engineering and Machinery. (16 000 words & fig.)

1935 **62 (06 (.42)**
Engineering, No. 3637, September 27, p. 332.
The British Association meeting at Norwich. — Section G. — Engineering, with Section J : **The applications of science to the control of road traffic.** (4 800 words & fig.)

1935 **621 .132.8 (.42) & 625 .232 (.42)**
Engineering, No. 3637, September 27, p. 334.
« **Silver Jubilee** » **train** on the London & North Eastern Railway. (2 000 words & fig.)

1935 **669 .1 (06 (.42**
Engineering, No. 3637, September 27, p. 341.
The Iron and Steel Institute; Manchester meeting. — **Heterogeneity of steel ingots.** — **Properties of patente steel wires.** (4 400 words.)

1935 **621 .43 (.82**
Engineering. No. 3637, September 27, p. 345.
270-b.h.p. **Diesel-electric narrow-gauge rail cars,** Fe rocarril Provincial, Buenos Aires (Argentina). (60 words.)

1935 **62. (01 & 66**
Engineering, No. 3637, September 27, p. 347.
HERBERT (A. M.) & THOMPSON (F. C.). — **Th use of the Hele-Shaw apparatus in the investigation o the flow of metals.** (2 200 words & fig.)

1935 **62. (01 & 66**
Engineering, No. 3638, October 4, p. 353.
WARREN (A. G.). — **Flash magnetisation for exa mining castings and forgings.** (1 400 words & fig.)

1935 **621 (064 (.42**
Engineering, No. 3638, October 4, p. 354.
Shipping, Engineering and Machinery Exhibition a Olympia, London. (7 000 words & fig.)

1935 **621 .43 (.42**
Engineering, No. 3638, October 4, p. 362.
Power unit for 150-h.p. **rail-car.** (1 300 words & fig.

1935 **669 .1 (06 (.42**
Engineering, No. 3638, October 4, p. 369.
The Iron and Steel Institute; Manchester meeting **Hele-Shaw apparatus for investigating flow of me tals.** (3 700 words.)

1935 **669 (06 (.42**
Engineering, No. 3638, October 4, p. 371.
The Institute of Metals; Newcastle meeting. — **Age hardening and creep performance** — **Creep under flexur al stresses.** (2 300 words.)

1935 **536 (0**
Engineering, No. 3638, October 4, p. 372.
International steam tables. (900 words & tables.)

1935 **621 .94 (.42**
Engineering, No. 3638, October 4, p. 379.
78-in. railway **wheel lathe.** (900 words & fig.)

1935 **621 .3**
Engineering, No. 3639, October 11, p. 383.
CHARD (F. de la C.). — **Technical and economi aspects of electrical generation.** — IV. (2 300 word & fig.)

1935 **62 (06 (.42**
Engineering, No. 3639, October 11, p. 384.
The British Association meeting at Norwich. — Sec tion G. — **Engineering.** (2 400 words.)

1935 **669 (06 (.42)**
Engineering, No. 3638, October 11, p. 397.
The Institute of Metals; Newcastle meeting. — **Effect of interrupted straining on lead. — Corrosion below oxide coatings on magnesium. — Protection of magnesium against corrosion.** (3 500 words.)

Engineering News-Record. (New York.)

1935 **62. (01 (.73), 621 .392 (.73) & 624. (0 (.73)**
Engineering News-Record, No. 12, September 19, p. 392.
Arc-welded bridge girders tested to failure. (2 000 words & fig.)

1935 **62. (01, 625 .14 (01 & 625 .143.5**
Engineering News-Record, No. 12, September 19, p. 395.
MOORE (H. F.). — **Rail fissures** traced to shattered steel and heavy wheel loads. (4 300 words & fig.)

1935 **624 .2 & 721 .9**
Engineering News-Record, No. 12, September 19, p. 406.
McCULLOUGH (C. B.). — **Flexural resistance of shallow concrete beams.** (1 500 words, 1 table & fig.)

1935 **625 .143.5 (.73)**
Engineering News-Record, No. 12, September 19, p. 411.
Rail-fissure research. (1 400 words.)

1935 **721 .1 (.73)**
Engineering News-Record, No. 14, October 3, p. 464.
RITTENBURG (W.). — **Precasting concrete piles** with a special armor belt. (1 300 words & fig.)

1935 **621 .392 & 625 .13**
Engineering News-Record, No. 14, October 3, p. 472.
HAWLEY (H. H.) & MERRELL (J. C.). — **Lessons** learned in **welding a steel-plate bridge floor.** (1 800 words & fig.)

Great Western Railway Magazine. (London.)

1935 **385. (093 (.42)**
Great Western Ry. Magazine, October, p. 547.
The Great Western Railway Company's centenary celebrations. (3 600 words & fig.)

1935 **621 .211 (.42) & 725 .31 (.42)**
Great Western Ry. Magazine, October, p. 555.
Completion of the Bristol (Temple Meads) improvement scheme. (1 600 words & fig.)

Journal of Applied Mechanics, A. S. M. E. (New York.)

1935 **621**
Journal of Applied Mechanics, A. S. M. E., September, p. A. 81.
JOHNSON (W. E.). — **A method of balancing reciprocating machines.** (4 800 words & fig.)

1935 **62. (01**
Journal of Applied Mechanics, A. S. M. E., September, p. A. 99.
VOSE (R. W.). — **An application of the interferometer strain gage in photo-elasticity.** (2 300 words & fig.)

1935 **614 & 62. (01**
Journal of Applied Mechanics, A. S. M. E., September, p. A. 103.
ORMONDROYD (J.). — **Recent research work in vibration and sound.** (1 500 words & bibliography.)

1935 **62. (01**
Journal of Applied Mechanics, A. S. M. E., September, p. A. 106.
SODERBERG (C. R.). — **Working stresses.** (2 500 words & fig.)

1935 **62. (01**
Journal of Applied Mechanics, A. S. M. E., September, P. A. 110.
Pitting due to rolling contact. (3 300 words & fig.)

Journal, Institution of Engineers, Australia. (Sydney, N. S. W.)

1935 **624 .8 (.944) & 625 .13 (.944)**
Journal, Institution of Engineers, Australia, August, p. 283.
FEWTRELL (A. C.). — **Repairs to bascule span of Clarence River bridge, Grafton.** (4 900 words & fig.)

1935 **669**
Journal, Institution of Engineers, Australia, August, p. 295.
WATERHOUSE (N. W.). — **Aluminium and its alloys.** — With special reference to transportation. (12 000 words & fig.)

Modern Transport. (London.)

1935 **385 .1 (.54)**
Modern Transport, No. 863, September 28, p. 3.
CARR (A. C.). — **The railways of India.** — Mileage and rail distances — diesel or steam locomotives — engine performance. (2 400 words.)

1935 **621 .133.1 (.436)**
Modern Transport, No. 863, September 28, p. 4.
STRAUSS (F.). — **Fuel consumption** on Austrian Railways. Recent technical improvements. (1 900 words.)

1935 **621 .43 (.82)**
Modern Transport, No. 863, September 28, p. 5.
Diesel-electric railcars for Argentina. — Sulzer engined units for Buenos Aires Provincial Railway. (1 200 words & fig.)

1935 **621 .138.1 (.42) & 725 .33 (.42)**
Modern Transport, No. 863, September 28, p. 7.
New locomotive depot for Southern Railway. (1 400 words & fig.)

1935 **656 (.42)**
Modern Transport, No. 863, September 28, p. 9.
MANCE (Sir H. Osborne). — **Road-rail division of function. Scope for transport monopolies.** (Abstract of an address to the National Road Transport Conference, Southport, September 24, 1935.) (3 500 words.)

1935 **656 (.42)**
Modern Transport, No. 863, September 28, p. 11.
Road operators fear monopoly. — Against co-ordination. (Discussion on Sir Osborne Mance's paper, summarised on pages 9 and 10.) (1 200 words.)

1935 **656 .211 (.42) & 725 .31 (.42)**
Modern Transport, No. 864, October 5, p. 3.
Reconstruction of Temple Meads station. Increased accommodation and running lines at Bristol. (3 700 words & fig.)

1935 **621 .13 (.54) & 625 .2 (.54)**
Modern Transport, No. 864, October 5, p. 6.
CARR (A. C.). — **An important Indian railway.** (2 000 words.)

1935 **656 .222.1 (.42)**
Modern Transport, No. 864, October 5, p. 7.
Steam train speed records. — L. N. E. R. « Silver Jubilee » on trial. (900 words, 1 table & fig.)

1935 **656 (.44)**
Modern Transport, No. 864, October 5, p. 9.
Road-rail co-ordination in France. — New regulations and their effect. (2 300 words.)

1935 **656 .211.7 & 699**
Modern Transport, No. 864, October 5, p. 11.
DENNY (M. E.). — **Cross-channel ships.** Evolution in design — Railway-owned vessels — Advent of the oil engine. (2 300 words.)

1935 **625 .4 (.42)**
Modern Transport, No. 865, October 12, p. 3.
Noise reduction on tube railways. (2 200 words.)

1935 **625 .176 (.9)**
Modern Transport, No. 865, October 12, p. 4.
The railway gauges of Australia. Conversion could not be justified. (2 000 words.)

1935 **656 .211 (.42), 656 .25 (.42) & 721 .31 (.42)**
Modern Transport, No. 865, October 12, p. 5.
Reconstruction of Bristol (Temple Meads) station. The new signalling installation. (2 100 words & fig.)

1935 **656 .23**
Modern Transport, No. 865, October 12, p. 7.
DAVIES (A.). — The sale of **passenger transport.** Modern methods on the railways. (1 000 words.)

1935 **656 (.44**
Modern Transport, No. 865, October 12, p. 9.
Road-rail co-ordination in France. Licences, compensation, and taxation. (2 100 words.)

Railway Age. (New York.)

1935 **624 .32 (.73**
Railway Age, No. 11, September 14, p. 326.
Great **bridge** at New Orleans nearing completion (4 700 words & fig.)

1935 **625 .234 (.73**
Railway Age, No. 11, September 14, p. 332.
Air-conditioning with no locomotive power drag (1 900 words & fig.)

1935 **625 .18 (.73) & 625 .27 (.73**
Railway Age, No. 12, September 21, p. 356.
Milwaukee opens system **plant for dismantling equipment.** (1 400 words & fig.)

1935 **625 .172 (.73**
Railway Age, No. 12, September 21, p. 359.
FARRINGTON (J. D.). — **Fewer foremen and more men solves branch-line problem.** (1 700 words & fig.

1935 **621 .134.1 (.73**
Railway Age, No. 12, September 21, p. 361.
High-speed auxiliary locomotive tested on Lehigh Valley. (1 400 words & fig.)

1935 **656 .23 (.73**
Railway Age, No. 12, September 21, p. 363; No. 13 September 28, p. 390.
KERR (J. L.). — **Factors which underlie railway traffic revival.** (6 800 words & fig.)

1935 **625 .215 (.73) & 656 .28 (.73**
Railway Age, No. 12, September 21, p. 367.
Arch-bar truck failures costly. (1 200 words & fig.

1935 **313 : 656 .2 (.73**
Railway Age, No. 12, September 21, p. 371.
WHITE (R. C.). — **Up-to-the-minute operating statistics.** (2 300 words.)

1935 **656 .256.3 (.73**
Railway Age, No. 13, September 28, p. 388.
Boston & Maine installs new signaling and remote control. (1 400 words & fig.)

1935 **625 .1 (06 (.73**
Railway Age, No. 13, September 28, p. 395.
Roadmasters celebrate golden anniversary. (Fiftieth convention held at Chicago, September 17-19, 1935.) — Abstracts of papers : Frogs; Switches and crossings. — Organization of track forces. — Maintaining tracks in terminals. — Handling and distribution of ties. — Ballasting and resurfacing track. — The place of the railroads in transportation. — Track maintenance of today. (8 500 words.)

1935 **621 .133.1 (06 (.73)**

Railway Age, No. 13, September 28, p. 401.

Fuel Association holds two-day meeting at Chicago. (September 18-19, 1935). — Abstracts of papers : Report on cost of unloading coal. — Fuel records vs. fuel costs. — New locomotive fuel. Economy device. — Steam turbine and condensing locomotive. (4 000 words.)

1935 **347 .763 (.73)**

Railway Age, No. 13, September 28, p. 407.

Motor Carrier Act effective October 1, 1935. (6 800 words.)

1935 **625 .13 (.73)**

Railway Age, No. 14, October 5, p. 426.

Illinois Central rebuilds 4 000 ft. of viaduct. (3 500 words & fig.)

1935 **385 .1 (.73)**

Railway Age, No. 14, October 5, p. 433.

Railroad reorganizations from 1915 to 1933 analyzed. — A statistical study of balance sheet items showing changes in financial structures. (4 700 words & tables.)

1935 **625 .122 (.73)**

Railway Age, No. 15, October 12, p. 456.

Missouri Pacific completes filling of 53 trestles. (2 400 words & fig.)

1935 **621 .139 (.73) & 625 .27 (.73)**

Railway Age, No. 15, October 12, p. 463.

Milwaukee opens system plant for dismantling equipment. (2 900 words & fig.)

1935 **621 .43**

Railway Age, No. 15, October 12, p. 469.

LIPETZ (A. I.). — **Possibilities of the Diesel locomotive.** (5 000 words.)

Railway Engineering and Maintenance. (Chicago.)

1935 **625 .143.5**

Railway Engineering & Maintenance, September, p. 500.

Track spikes — can they be standardized ? (3 200 words & fig.)

1935 **625 .123 (.73) & 625 .172 (.73)**

Railway Engineering & Maintenance, September, p. 504.

Cutting ditching costs. (1 700 words & fig.)

1935 **721 .5 (.73)**

Railway Engineering & Maintenance, September, p. 506.

Roofs — **Constructing an asbestos-felt built-up roof.** (3 600 words & fig.)

1935 **625 .16 (.73)**

Railway Engineering & Maintenance, September, p. 510.

CURTISS (W. L.). — **Tests of track pans lead to improved design.** (3 000 words & fig.)

1935 **62. (01 & 691**

Railway Engineering & Maintenance, September, p. 513.

von SCHRENK (Dr. H.). — **How marine borers attack creosoted piles.** (1 800 words & fig.)

1935 **621 .392 & 625 .143.4**

Railway Engineering & Maintenance, September, p. 523.

ELMER (W.). — **New joints when welding rails ?** (1 000 words.)

Railway Gazette. (London.)

1935 **656 .222.1 (.42)**

Railway Gazette, No. 13, September 27, p. 488.

L. N. E. R. Pacific performance. (700 words & tables.)

1935 **621 .132.5 (.44)**

Railway Gazette, No. 13, September 27, p. 489.

New three-cylinder simple 2-10-2 locomotive, Alsace-Lorraine Railways. (900 words & fig.)

1935 **621 .392 (.43) & 625 .13 (.43)**

Railway Gazette, No. 13, September 27, p. 492.

BONDY (O.). — **Progress in welding large railway bridges.** (2 300 words & fig.)

1935 **621 .43 (.42) & 656 .212.6 (.42)**

Railway Gazette, No. 13, September 27, p. 499.

Mobile cranes in railway service. (850 words & fig.)

1935 **656 .283 (.42)**

Railway Gazette, No. 13, September 27, p. 506.

Ministry of Transport **accident report :** Welwyn Garden City, London & North Eastern Ry. : June 15, 1935. (6 500 words.)

1935 **656 .222.1 (.42)**

Railway Gazette, No. 14, October 4, p. 520.

The L. N. E. R. « Silver Jubilee » record. (1 600 words.)

1935 **625 .172 (.82) & 625 .175 (.82)**

Railway Gazette, No. 14, October 4, p. 529.

CRESWELL (F. L.). — **Motor trolley maintenance of permanent way in Argentina — I.** (1 500 words & a map.)

1935 **625 .4 (.73)**

Railway Gazette, No. 14, October 4, p. 531.

ARTHURTON (A. W.). — **The underground freight railways of Chicago.** (1 200 words.)

1935 **621 .138.1 (.42) & 725 .33 (.42)**

Railway Gazette, No. 14, October 4, p. 532.

Modernised locomotive and carriage depot at Battersea, Southern Ry. (1 400 words & fig.)

1935 **621 .134.1 (.42) & 621 .138.5 (.42)**

Railway Gazette, No. 14, October 4, p. 537.

Machining locomotive cylinders at Doncaster works, L. N. E. R. (1 200 words & fig.)

1935 **621 .132.8 (.62)**
Railway Gazette, No. 14, October 4, p. 539.
New **articulated steam railcars** for Egypt. (1 900 words & fig.)

1935 **656 .222.1 (.42)**
Railway Gazette, No. 14, October 4, p. 545.
The Silver Jubilee streamlined train, L. N. E. R. (3 500 words & fig.)

1935 **656 .223.1 (.42)**
Railway Gazette, No. 15, October 11, p. 577.
Slip coach services. (1 200 words & 1 table.)

1935 **656 .25 (.42)**
Railway Gazette, No. 15, October 11, p. 583.
Twenty-five years of **railway signalling.** (3 000 words.)

1935 **621 .138.3 (.42)**
Railway Gazette, No. 15, October 11, p. 585.
Engine cleaning on the L. N. E. R. (250 words & fig.)

1935 **621 .138.5 (.66) & 625 .26 (.66)**
Railway Gazette, No. 15, October 11, p. 587.
SELLS (Major M. P.). — The **locomotive, carriage and wagon workshops** of the Nigerian Ry. — Part I — General description of the shops; Organisation, costing, scheduling and progressing methods. (1 300 words, 1 table & fig.)

1935 **656 .253 (.42)**
Railway Gazette, No. 15, October 11, p. 589.
Illumination of speed limit boards. (200 words & fig.)

1935 **621 .131.1**
Railway Gazette, No. 15, October 11, p. 591.
DIAMOND (E. L.). — **The horse-power of locomotives** — its calculation and measurements — VII. (2 000 words.)

1935 **625 .1 (.62)**
Railway Gazette, No. 15, October 11, p. 592.
The Cairo-Suez direct line, Egyptian State Railways. (500 words & fig.)

1935 **385 (091 (.481)**
Railway Gazette, No. 15, October 11, p. 594.
Railway developments in Norway. New lines, gauge conversion and electrification in progress. (1 200 words & fig.)

1935 **621 .94 (.42)**
Railway Gazette, No. 15, October 11, p. 596.
A new Herbert vertical milling machine. (700 words & fig.)

1935 **621 .43 (.931)**
Railway Gazette, No. 15, October 11, p. 601.
Railcars for New Zealand. (600 words & fig.)

1935 **385 (091 (.66)**
Railway Gazette, No. 15, October 11, p. 603.
The Abyssinian Railway. (1 300 words & a map.)

1935 **621 .43 (.489)**
Diesel Ry. Traction, p. 558, Supplt. to the Ry. Gazette October 4.
PEDERSEN (F. P.). — **Diesel traction experience** in Denmark. (4 500 words & fig.)

1935 **621 .43 (.42) & 621 .8 (.42)**
Diesel Ry. Traction, p. 566, Supplt. to the Ry. Gazette October 4.
Cotal electrically-controlled gearbox on the test bench (500 words & fig.)

1935 **621 .43 (.82)**
Diesel Ry. Traction, p. 568, Supplt. to the Ry. Gazette October 4.
Metre-gauge diesel cars for South America. (2 600 words & fig.)

Railway Magazine. (London.)

1935 **656 .222.1 (.42)**
Railway Magazine, October, p. 244.
ALLEN (C. J.). — **British locomotive practice and performance.** (3 800 words & fig.)

1935 **656 .222.1 (.44)**
Railway Magazine, October, p. 267.
Rebuilt French express locomotive performance. — II. — On the Nord, Est, and P. L. M. Railways. (4 000 words, tables & fig.)

Railway Signaling. (Chicago.)

1935 **621 .392 (.73) & 656 .25 (.73)**
Railway Signaling, September, p. 463.
Primary battery costs being reduced on the Santa Fe (4 600 words, 5 tables & fig.)

1935 **656 .254 (.73)**
Railway Signaling, September, p. 469.
Cab signaling on Lehigh Valley. (3 400 words & fig.)

1935 **656 .258 (.73)**
Railway Signaling, September, p. 472.
PRICE (W. F.). — **Automatic interlocking** of two junctions involving spring switches. (1 700 words & fig.)

1935 **656 .258 (.73) & 656 .283 (.73)**
Railway Signaling, September, p. 475.
Accident at automatic plant. (3 000 words & fig.)

1935 **656 .254 (.73)**
Railway Signaling, September, p. 477.
New **signaling** on the Boston & Maine. (2 900 words & fig.)

The Oil Engine. (London.)

1935 **621 .43 (.42)**
The Oil Engine, January, p. 262.
Transport engines on the British market. (400 words & tables.)

1935 **621 .43 (.73)**

he Oil Engine, January, p. 266.

Standardizing an American shunting locomotive. (300 ords & fig.)

1935 **621 .43 (.∞)**

he Oil Engine, January, p. 272.

Diesel rail traction in 1934. (1 400 words & fig.)

1935 **625 .232 & 625 .234**

he Oil Engine, January, p. 274.

Railway **kitchen cars** with high-speed generating sets. 1 000 words & fig.)

1935 **621 .43 (.42)**

he Oil Engine, January, p. 287.

The Air Ministry's new **Diesel shunter.** (600 words fig.)

1935 **621 .43 (.73)**

he Oil Engine, January, p. 294.

A 3 600 b.h.p. locomotive. (500 words & fig.)

1935 **621 .43 (.44)**

ne Oil Engine, February, p. 304.

The largest **oil-engined locomotives. Two 4 000 b.h.p.** nits for Paris-Riviera service. Four-stroke — pres-re charged — Diesel motors. (400 words.)

1935 **621 .43 (.54)**

ne Oil Engine, February, p. 319.

Six 160 b.h.p. **railcars** for India. (600 words & fig.)

1935 **621 .43**

ne Oil Engine, March, p. 327.

CODRINGTON (G. W.). — The future of **diesel rail action.** Big developments pending in America. (600 ords.)

1935 **621 .43 (.73)**

ne Oil Engine, March, p. 332.

MANN (Ch. F. A.). — The latest **Diesel train.** 100 p.h. five-car unit carrying 140 passengers. Further ogress in stainless-steel construction. (1 500 words & .)

1935 **621 .43 (.42)**

ne Oil Engine, March, p. 341.

A silent railcar. The Coventry pneumatic car and ssible oil engine development. (500 words & fig.)

1935 **621 .43 & 621 .8**

ne Oil Engine, March, p. 348; April, p. 371.

Hydraulic transmission systems for Diesel rail hicles. (3 500 words & fig.)

1935 **621 .43 (.489)**

e Oil Engine, April, p. 358.

The first complete Diesel express train service, nish State Railways. (3 000 words & fig.)

1935 **621 .43 (.73)**

The Oil Engine, April, p. 379.

MANN (Ch. F. A.). — New **diesel trains** in America. (800 words & fig.)

1935 **621 .139 (.489) & 621 .43 (.489)**

The Oil Engine, April, p. 380.

Electrical control system for Danish express trains. (2 300 words & fig.)

Transit Journal. (New York.)

1935 **625 .2 (01 & 625 .214**

Transit Journal, September, p. 275.

Truck nosing corrected. (2 000 words & fig.)

1935 **621 .331 (.71)**

Transit Journal, September, p. 283.

Rectifiers successful in Montreal. (2 200 words.)

1935 **621 .93 (.73) & 625 .144.1 (.73)**

Transit Journal, September, p. 285.

MARTIN (J. L.). — **Rail cutting machine.** (700 words & fig.)

In Bulgarian.

(= 91.881)

Archiv. (Sofia.)

1931 **656 .254 = 91 .881**

Archiv, p. 107.

KRASTEV. — Automatic train control. (24 pages & diagr.)

1931 **624 = 91 .881**

Archiv, p. 131.

TABAKOV. — Reinforced concrete *vice* steel in the construction of railway bridges. (72 pages, diagr. & fig.)

1931 **656 .231 (.497.2) = 91 .881**

Archiv, p. 246.

BALEVSKI. — The guiding principles (passenger and goods) of rate making on the Bulgarian State Rys. (51 pages.)

1933 **656 .211 (.497.2) = 91 .881**

Archiv, p. 3.

SISKOV. — Rebuilding the Sofia passenger station. (24 pages & fig.)

1933 **625 .111 (.497.2) = 91 .881**

Archiv, p. 72.

SISKOV & BALEVSKI. — Improving the gradients and layout of the Sofia-Varna line. (64 pages, diagr. & fig.)

1933 **385 .587 (.43) = 91 .881**
Archiv, p. 103.
POPOV. — The scientific organisation of work in the German railway shops. (50 pages, diagr. & fig.)

1933 **656 .211.5 = 91 .882**
Archiv, p. 200.
MAKEDONSKI. — Platform roofs in passenger stations (systems, materials and constructional methods). (45 pages & fig.)

Spisanie. (Sofia.)

1933 **625 .173 (.497.2) = 91 .881**
Spisanie, March, p. 353.
DRANDAROV. — Track maintenance (general renewal) on the Bulgarian State Railways. (1 800 words.)

1933 **385 .1 (.497.2) = 91 .881**
Spisanie. October-November, p. 149.
SGUREV. — The economic position of the Bulgarian Railways. (4 800 words.)

1933 **621 .138.5 = 91 .882**
Spisanie, December, p. 220.
Repairing copper tube plates by welding. (3 000 words.)

1934 **625 .1 (.497.2) = 91 .881**
Spisanie, January, p. 263.
The opening to traffic of the Plovdiv-Karlovo line. (2 100 words & fig.)

1934 **625 .173 (.497.2) = 91 .881**
Spisanie, January, p. 287.
DANDAROV. — Results of track renewal on the Bulgarian State Railways in 1933. (1 200 words.)

1934 **385 .6 = 91 .881**
Spisanie, February-March, p. 309.
PETKOV. — The Rome Conference for the revision of the International Agreement on the carriage of goods, passengers and luggage by railway. (2 400 words.)

1935 **656 .2 = 91 .881**
Spisanie, February-March, p. 313.
SGUREV. — Rationalisation of the railway operating service. (3 000 words.)

1935 **625 .14 (.497.2) = 91 .881**
Spisanie, February-March, p. 321.
DANDAROV. — Track condition on the main lines of the Bulgarian State Railways. (2 700 words.)

1934 **385 (07.2 (.497.2) = 91 .881**
Spisanie, February-March, p. 329.
DOBREV. — The part played by the chemical laboratory of the General Management of the Bulgarian State Railways. (1 500 words.)

1934 **385 .517.6 (.497.2) = 91 .881**
Spisanie, February-March, p. 332.
KOICEV. — Convalescent homes for employees of the Bulgarian State Railways in 1933. (6 600 words.)

1934 **625 .142.2 (.497.2) = 91 .881**
Spisanie, May-June, p. 399.
BOIADZIEV. — Methods used for treating railway sleepers. (6 000 words.)

1934 **656 .211.7 (.497.2) = 91 .881**
Spisanie, July, p. 123.
NIKOLOV. — Ferryboats and Bulgaria. (3 000 words.)

1934 **656 .254 = 91 .881**
Spisanie, October, p. 153.
VLAIKOV. — An application of the train dispatching system. (3 900 words & fig.)

1934 **656 .254 (.42) = 91 .881**
Spisanie, December, p. 235.
VLAIKOV. — The train dispatching system in Great Britain. (2 700 words & fig.)

1935 **625 .253 = 91 .881**
Spisanie, January-February, p. 6.
KUBIN. — Train brakes. — The « Bozic » brake for goods trains. (3 600 words & fig.)

1935 **625 .174 = 91 .881**
Spisanie, January-February, p. 12.
MAKEDONSKI. — The effect of snow on train working. (4 200 words.)

1935 **385. (06 = 91 .881**
Spisanie, March, p. 75; April, p. 119; May, p. 171.
VLAIKOV. — International Associations in the matter of railways. (Aim, evolution and organisation.) (9 600 words.)

1935 **625 .248 (.497.2) = 91 .881**
Spisanie, April, p. 123.
ANDREIEV. — Goods wagon disinfecting plant at the Sofia station. (2 400 words & fig.)

1935 **313 .385 (.497.2) = 91 .881**
Spisanie, May, p. 163.
SGUREV. — The position of the Bulgarian State Railways as depicted by the 1933/1934 statistics. (2 400 words.)

1935 **621 .134 (.497.2) = 91 .881,**
625 .18 (.497.2) = 91 .881
& 625 .27 (.497.2) = 91 .881
Spisanie, June, p. 221.
GLAVCEV. — The accounting and stores service on the Bulgarian State Railways. (5 100 words.)

1935 **621 .43 = 91 .881**
Spisanie, June, p. 232.
SAPUNOV. — Railcar engines. (1 800 words.)

In Spanish.

Anales de la Asociación de Antiguos Alumnos del I. C. A. I. (Madrid.)

1935 **621 .43 (.460)**

nales de la Asociación de Antiguos Alumnos del I. C. A. I., septiembre, p. 475.

MAULEON (F.). — Nuevos **automotores** para la mpañía de Ferrocarriles de Madrid-Zaragoza-Alinte. (2 200 palabras & fig.)

Caminos de hierro. (Madrid.)

1935 **656 .231**

minos de hierro, septiembre, p. 251.

GARCIA DE LA SOTA (A.). — Las **tarifas ferroarias** en sus aspectos comercial, administrativo y rídico. (1 500 palabras.)

Ferrocarriles y Tranvías. (Madrid.)

1935 **625 .2 & 669**

rrocarriles y Tranvías, septiembre, p. 250.

HUG (A. M.). — Nuevo tipo de **carrocerías ultraeras** para automotores y autobuses. (1 000 palabras fig.)

1935 **385**

rrocarriles y Tranvías, septiembre, p. 254.

SANCHEZ MORENO (R.). — Problemas de **economía ferroviaria.** (2 400 palabras & fig.)

1935 **388 (.43)**

rrocarriles y Tranvías, septiembre, p. 259.

La **evolución de los trasportes urbanos** de Berlín. 100 palabras & fig.) (Continuará.)

Ingeniería y Construcción. (Madrid.)

1935 **621 .43**

geniería y Construcción, octubre, p. 592.

BOTIN (C.). — **Automotores.** (3 100 palabras & fig.)

vista del Colegio de Ingenieros de Venezuela. (Caracas-Venezuela).

1935 **624 .63**

vista del Colegio de Ingenieros de Venezuela, julio y agosto, p. 1339.

Puentes rígidos de concreto analizados sin matemáas superiores. (9 700 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1935 **656 (.460)**

vista de Obras Públicas, N° 18, 15 de septiembre, p. 337.

BOTIN (C.). — **Coordinación y competencia.** (4 000 abras & fig.)

1935 **625 .1**

Revista de Obras Públicas, N° 20, 15 de octubre, p. 386.

REBOLLO (G.). — Los **ferrocarriles en construcción** y el paro obrero. (2 600 palabras.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1935 **621 .33 (.45)**

Annali dei lavori pubblici, aprile, p. 257.

NAPOLI (A. di). — Gli **impianti di elettrificazione** della direttissima Firenze-Bologna. (12 000 parole & fig.)

1935 **62. (01**

Annali dei lavori pubblici, aprile, p. 302.

ARCANGELI (A.). — Sulla **stabilita delle travi tubolari inflesse.** (4 300 parole & fig.)

La tecnica professionale. (Firenze.)

1935 **621 .33 (.45)**

La tecnica professionale, ottobre, p. 289.

CIOCIA (D.). — **Trazione trifase a bassa** frequenza **e trazione a corrente continua** alta tensione. (2 800 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1935 **656 .254**

Rivista tecnica delle ferrovie ital. 15 settembre, p. 169.

MASCINI (A.). — **Apparecchio per la ripetizione e la registrazione delle segnalazioni** della via nella cabina delle locomotive ed automotrici (13 500 parole & fig.)

Trasporti e lavori pubblici. (Roma.)

1935 **656 (.45)**

Trasporti e lavori pubblici, settembre, p. 325.

CESCO ZANETTE. — La nuova **tassa sui trasporti merci** e la concorrenza. (1 000 parole.)

In Dutch.

De Ingenieur. (Den Haag.)

1935 **624 .32 (.492)**

De Ingenieur, N° 40, 4 October, p. A. 349.

Brug over de Waal te Nijmegen. (11 500 woorden & fig.)

1935 **624 & 691**

De Ingenieur, N° 40, 4 October, p. Bt. 71.

BOONSTRA (G. C.). — Toepassing van beton voor **brugfundeeringen.** (7 600 woorden & fig.) (Wordt vervolgd.)

Spoor- en Tramwegen. (Utrecht.)

1935 **621 .132.1 (.44)**

Spoor en Tramwegen, N° 20, 24 September, p. 461.

ROSENTHAL (G. A.). — **P. L. M. Locomotieven.** (2 500 woorden & fig.)

1935 **385. (06.4 (.493)**

Spoor en Tramwegen, N° 21, 8 October, p. 497.

Het **verkeerswezen** op de Tentoonstelling te Brussel. (1 800 woorden.)

1935 **385 .1 (.494) & 656 (.494)**

Spoor en Tramwegen, N° 21, 8 October, p. 500.

Autoconcurrentie en financieele toestand der Zwitsersche Bondsspoorwegen. (1 000 woorden.)

1935 **656 (.44)**

Spoor en Tramwegen, N° 22, 22 October, p. 515.

De nieuwe fransche **coördinatie-wetgeving-1935.** (5 000 woorden.)

1935 **656 .211 (.492)**

Spoor en Tramwegen, N° 22, 22 October, p. 524.

VAN RAVENSTEYN (S.). — **Station Rotterdam-Zuid** (1 400 woorden & fig.)

1935 **621 .33 (.492)**

Spoor en Tramwegen, N° 22, 22 October, p. 529.

Electrificatie van de lijn Haarlem-Zandvoort. (1 000 woorden.)

In Portuguese.

Gazeta dos caminhos de ferro. (Lisboa.)

1935 **385 .1**

Gazeta dos caminhos de ferro, N° 1147, 1 de outubro, p. 403.

SOUSA (F. de). — **A crise dos caminhos de ferro. Males e remédios.** (2 000 palavras.)

In Czech.

(= 91.886)

Zprávy železničních inženýrů. (Praha.)

1935 **625 .17 (.437) = 91 .886**

Zpravy zeleznicnich inzenyru, N° 6, p. 96.

PELIKAN. — Reorganisation of the permanent way service on the Czechoslovak State Railways. (3 1/2 pages.)

1935 **656 .253 = 91 .88**

Zpravy zeleznicnich inzenyru, N° 7, p. 103.

HALAVANJA. — The 3-aspect warning signal give additional safety. (3 pages.)

Casopis pro železniční právo a politiku. (Praha).

1935 **385 .5 (.437) = 91 .886**

Casopis pro zeleznicni právo a politiku, N° 6, p. 81.

HOLY & CHMELAR. — The principle of staff specialisation on the Czechoslovak State Railways (10 pages.)

Železniční Revue. (Praha.)

1935 **656 (.43 + .494) = 91 .886**

Zeleznicni Revue, N° 12, p. 177.

KNÖPFELMACHER. — New tendencies in the matter of road motor transport regulation (Germany Switzerland). (3 pages.)

In Jugoslav.

(= 91.882)

Saobračajni Pregled. (Beograd.)

1935 **625 .13 = 91 .882**

Saobracajni Pregled, N° 5, p. 170.

BERN. — Defects of railway tunnels, their repair and maintenance. (6 1/2 pages.)

1935 **656 .223.2 (.497.1) = 91 .882**

Saobracajni Pregled, N° 6, p. 193.

MACKOVSEK. — The use of the goods wagon stock on the Jugoslav State Railways. (8 pages & diagr.)

1935 **656 .225 (.497.1) = 91 .882**

Saobracajni Pregled, N° 6, p. 201.

STANKOVIC. — A few remarks about the question of fast light trains. (5 pages.)

1935 **313 .385 (.497.1) = 91 .882**

Saobracajni Pregled, N° 6, p. 206.

LAMPRECHT. — Reorganisation of the commercial and technical statistics of the Jugoslav State Railways. (7 1/2 pages.)

1935 **621 .133.3 = 91 .882 & 621 .392 = 91 .882**

Saobracajni Pregled, N° 6, p. 215.

KNEZ. — Welding locomotive copper fireboxes. (5 1/2 pages.)

M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

ANALYTICAL TABLE OF ARTICLES

ARRANGED ACCORDING TO THE DECIMAL CLASSIFICATION

(1935)

	Month.	Page
3. Sociology in General.		
313. Statistics on special topics.		
313 : 385. General railway statistics.		
Les Grands Réseaux de Chemins de fer français, année 1934 (*The French Main Line Railways, 1934*), by R. GODFERNAUX. *(New book.)*	July.	884
313 : 625 .143.3. Statistics of rail breakages.		
Statistics of rail breakages, 1933-1934. — Part I	December.	1455
313 : 625.2. Statistics of rolling stock.		
Statistics and the economical working of railways. An investigation into the maintenance of rolling stock, by Dr. Fr. LANDSBERG	November.	1332
351. Finance. Administration.		
351 .712. Specifications, etc...		
Recueil des spécifications techniques et cahiers des charges unifiés des Grands Réseaux de chemins de fer français (*The French Main-Line Railways' Standard Specification. New edition*). *(Review.)*	September.	1200
385. Railways from a general, economic and financial point of view.		
385. (02. Railway handbooks, treatises, etc.		
The Universal Directory of Railway Officials and Railway Year Book, 1935-1936. *(New book.)*	October.	1290
385. (06. Societies, associations, scientific congresses.		
385. (06.111. International Railway Congress Association. Official documents.		
Meetings held by the Permanent Commission in Brussels (4-6 July, 1935)	September.	1177
Appendix 1 : List of Members and their Assistants, who attended the Meetings	»	1181
Appendix 2 : List of questions selected for the Agenda of the 13th Session (Paris, 1937).	»	1183
List of members of the Permanent Commission (4th July 1935)	October.	1294

	Month.	Page.
385. (092. Biographies. Obituary notices.		
G. Philippe	December.	1495
385. 1 Railways from a financial point of view. Their effect on a country's finances.		
Wirtschaftsführung und Finanzwesen der Deutschen Reichsbahn (*The economic and financial management of the Reichsbahn*). — Published by the GENERAL MANAGEMENT of the DEUTSCHE REICHSBAHN (German State Railway Company). (*New book.*)	January.	132
The world crisis and railways: Effects of the crisis on railway working and measures taken to lessen these effects, etc.:		
First report covering secondary railways in Countries of Southern Europe and their Colonies, by Messrs. E. LA VALLE and E. MELLINI . . .	April.	365
Second report, covering main line railways, except those affiliated to the International Railway Union (U. I. C.), by Mr. ASHTON DAVIES . .	July.	771
Second report, covering secondary railways in countries of Southern Europe and their Colonies, by E. LAVALLE and E. MELLINI	»	791
Second report (Main-line railways in countries affiliated to the International Railway Union), by Dr. COTTIER, and Herr VON BECK . . .	September.	1105
Special report, by Herr VON BECK	»	1147
Summary of sectional discussion of above question (Enlarged meeting of the Permanent Commission of the International Railway Congress Association, 4-6 July 1935)	»	1168
Final summaries adopted (Plenary meeting, 6 July 1935)	»	1173
385 .11. Cost of construction and revenue derived.		
385 .113. Working results.		
Les Grands Réseaux de Chemins de fer français, année 1934 (*The French Main-Line Railways, 1934*), by R. GODFERNAUX. (*New book.*)	July.	884
385 .12. Means employed by the State to encourage railways being built. Facilities granted. Concessions.		
Les concessions de chemins de fer en droit suisse (*Railway Concessions according to Swiss law*), by J. HAENNI. (*New book.*)	May.	606
6. Useful Arts.		
608. Inventions. Patents.		
Amerikanische Erfinder (*American inventors : Morse, Bell, Edison*), by E. EICHENBERGER. (*New book.*)	October.	1291
62. Engineering.		
62. (01. Strength of materials. Physical tests.		
Stress distribution in aluminium connecting rods, by R. L. TEMPLIN . . .	October.	1252

621. Mechanical and electrical engineering.	Month.	Page.
621 .1. Steam engineering.		
621 .13. Locomotive engines.		
Rolling stock improvements made by the French Main-Line Railways since the war	January.	77
621 .13. (02. Handbooks, treatises, etc...		
Leitfaden für den Dampflokomotiv Dienst (Manual for the steam locomotive staff), by L. NIEDERSTRASSER. *(New book.)*	December.	1494
621 .131. Theory of the locomotive.		
Is the steam locomotive out of date ? by H. NORDMANN	July.	857
621 .131.3. Tests.		
Results of recent steam locomotive tests, by Dr.-Ing. H. NORDMANN	May.	575
621 .132. Various classes of locomotive.		
621 .132.1. Locomotives in different countries.		
Die Einheitslokomotiven der Deutschen Reichsbahn im Bild (*Reichsbahn standard locomotives illustrated*), 4th edition, by Hermann MAEY. (*New book.*)	July.	881
621 .132.3. Passenger train locomotives with 4 or more coupled wheels.		
Austrian Federal Railways 2-8-4 express locomotives (classes 114 and 214), by J. NEBLINGER	January.	68
The heaviest tank locomotive in the world, by F. S. DORTMUND	»	121
2. P 2 class 2-8-2 type express passenger locomotive No. 2002, « Earl Marischal », London and North Eastern Railway	»	129
New three-cylinder 4-8-2 express locomotive, Czechoslovak State Railways	March.	351
Increasing the efficiency of express locomotives, Eastern Railways of France	June.	742
New 4-cylinder simple expansion 4-6-2 express locomotives, Belgian National Railways Company	June.	758
Locomotives à grande vitesse à bogie et 4 essieux accouplés compound à 4 cylindres à large circuit de vapeur, haute surchauffe et distribution par soupapes provenant de la transformation des locomotives « Pacific » à roues motrices de 1.85 m. de diamètre, série 4501 à 4570 de la Compagnie d'Orléans (*High-speed 4-8-0 four-cylinder compound locomotives with large-section steam passages, high superheat, and poppet valve gear, rebuilt from the Orléans Company's « Pacific » type locomotives with 6 ft. 13/16 in diameter driving wheels, numbers 4501 to 4570*), by A. CHAPELON. *(New book.)*	October.	1292
The « Silver Jubilee » train, London & North Eastern Railway, by O. BULLEID	November.	1299
Atlantic type streamlined locomotives, Chicago, Milwaukee, St. Paul & Pacific Railroad	November.	1395
New German streamlined 4-6-4 type locomotives	December.	1437
621 .132.5. Goods train locomotives with 6 or more coupled wheels.		
New 2-10-0 goods locomotives for the German State Railways	March.	330

	Month.	Page.
621 .132.6. Tank locomotives.		
The heaviest tank locomotive in the world, by F. S. DORTMUND	January.	121
Three-cylinder simple-expansion 2-8-2 tank locomotives for suburban trains, Est Railway, France	March.	353
621 .132.8. Special types. Steam railcars, etc.		
Modern Traction for Industrial and Agricultural Railways. Published by the LOCOMOTIVE PUBLISHING Co. *(New book.)*	April.	477
New turbine-driven 4-6-2 express locomotive, London Midland & Scottish Railway	October.	1239
The London Midland & Scottish Railway turbine locomotive. Details of the roller bearing axle boxes	November.	1393
Atlantic type streamlined locomotives, Chicago, Milwaukee, St. Paul & Pacific Railway	November.	1395
New German streamlined 4-6-4 type locomotives	December.	1437
621 .133. Production of steam in locomotives.		
621 .133.1. Fuel. Combustion. Fuel consumption.		
Mechanisation of the control of the fuel used and the distance run by locomotives. The « Rona » locomotive meter, by N. M. MOTCHAROFF and A. S. SOKOLOFF	October.	1225
Fuel consumption on Austrian railways, by F. STRAUSS	December.	1489
621 .133.2. Fire box, grate and ashpan.		
Air preheater for locomotive fireboxes	November.	1397
621 .133.7. Boiler feeding. Water treatment. Antifouling compounds.		
Water-softening plant on the London & North Eastern Railway. New installations	December.	1492
621 .134. The steam engine.		
621 .134.1. Driving mechanism.		
Locomotive crank axles, by F. L. BAXTER	February.	257
Stress distribution in aluminium connecting rods, by R. L. TEMPLIN	October.	1252
The crank axles used on the Paris-Lyons-Mediterranean Company's 4-8-2 class A locomotives, by Mr. CHAN	October.	1283
621 .134.3. Various valve gears. High pressures. Superheating.		
New French superheaters. Latest type of Houlet annular superheater	June.	760
621 .135. Vehicle of the locomotive.		
621 .135.2. Wheels. Axles. Axle boxes. Lubrication of journals, etc...		
Locomotive axle failures and wheel-press fits, by T. V. BUCKWALTER and P. C. PATERSON	November.	1367
High-pressure lubrication for journal bearings, by G. WELTER	November.	1375
The London Midland & Scottish Railway turbine locomotive. Details of the roller bearing axleboxes	November.	1393

	Month.	Page.
621 .135.4. Lateral play on curves. Bogies, bissel trucks, etc.		
The mechanics of a locomotive on curved track, by S. R. M. PORTER. (*New book.*)	October.	1293
Fast running without derailment, by Dr. Ing. BÄSELER	November.	1378
621 .137. Locomotive working. Duties of locomotive staff, etc...		
621 .137 (02. Handbooks, etc...		
Leitfaden für den Dampflokomotivdienst (*Manual for the steam locomotive staff*), by L. NIEDERSTRASSER. (*New book.*)	December.	1494
621 .138. Laying up and maintaining the locomotives.		
621 .138.5. Repair shops.		
Austrian Federal Railways Workshops Department reorganisation and development, by F. STRAUSS	January.	112
Statistics and the economical working of railways. An investigation into the maintenance of rolling stock, by Dr. Fr. LANDSBERG	November.	1332
621 .3. Electrical engineering.		
621 .33. Electric railways and tramways. Railway electrification.		
Railway electrification in 1934	March.	329
Ground detector for A. C. track circuits on electrified lines, by Ch. F. HOWE	May.	592
Southern Railway electrification to Hastings (England)	October.	1261
621 .335. Electric locomotives and railcars.		
Rolling stock improvements made by the French Main-Line Railways since the war	January.	77
The Dutch diesel train failures	June.	746
Present tendencies in electric locomotive construction	December.	1487
621 .39. Miscellaneous uses of electricity (Braking, welding, lighting, heating, etc.).		
621 .392. Electric welding.		
Strengthening railway bridges by welding, by Otto BONDY	March.	321
Welded coach construction on the Chicago, Milwaukee, St.-Paul and Pacific Railroad	April.	473
Handbook for electric welders, by J. H. PATERSON (*New book*)	April.	476
Experimental determination of the shrinkage stresses in butt-welded joints, by Dr.-Ing. G. BIERETT	September.	1185
Die Entwicklung der Schienenstosschweissung und das Studium der geschweissten Schienenstossverbindungen (*The development of rail joint welding and the study of welded joints*), by D. CSILLERY (*New book*)	September.	1200
621. 4. Air, gas and oil engines.		
621 .43. Ignited-gas engines. Internal combustion engines. Petrol engines.		
Rail motor cars from the point of view of their construction (Investigation into questions of immediate interest. — Question I) :		
A. — *Types of engines. Forms of transmissions. Running gear. Brakes.* — Report covering the countries outside the European Continent, by E. WANAMAKER	January.	7

	Month.	Page.
B. — *Underframe and body — Heating and ventilation — Auxiliary apparatus — Fire protection.* — Report (Countries of the European Continent), by L. DUMAS and J. LEVY	June.	616
B. — I. *Additional information and data brought up to date on the points already dealt with in part A (Types of engines, Forms of transmissions, Running gear, Brakes)* — and II: *Body design — Lighting, heating and ventilation — Sundry apparatus and fire prevention — Speed characteristics and carrying capacity.* — Report (Countries outside the European Continent), by E. WANAMAKER	»	657
Complete and revised report — Parts A and B — (*Countries of the European Continent*), by L. DUMAS and J. LEVY	August.	887
Special report, by L. DUMAS	»	1075
Summary of sectional discussion of above question (Enlarged Meeting of the Permanent Commission of the International Railway Congress Association, 4-6 July 1935)	»	1089
Final summaries adopted (Plenary meeting, 6 July 1935)	September.	1173
Transmissions for diesel locomotives and railcars. Recent developments in Vulcan-Sinclair couplings for traction applications, by STUART MIALL	April.	450
Mechanical transmissions for railcars (The S.L.M.-Winterthur system applied to French vehicles)	April.	456
Direct-drive diesel locomotives, by G. DELANGHE	April.	460
Modern Traction for Industrial and Agricultural Railways. Published by the LOCOMOTIVE PUBLISHING Co. (*New book.*)	April.	477
The Dutch diesel train failures	June.	746
A contribution to the comparative study of the different types of electric transmission used on diesel-electric railcars, by E. HENNIG	July.	797
Diesel locomotives and railcars, by Brian REED. (*New book.*)	September.	1199
The Deutsche Reichsbahn railcars with self-contained power plant, by Herr BREUER	October.	1278
The Trilok hydraulic transmission	November.	1383
Diesel fuels and their selection, by H. N. BASSETT	December.	1448
621. 8. Power and power transmission. Mechanical handling.		
La manutention mécanique (*Mechanical handling*), by Marcel LEGRAS. (*New book.*)	April.	478
The Trilok hydraulic transmission	November.	1383
624. Bridges and framework.		
Strengthening railway bridges by welding, by Otto BONDY	March.	321
625. Railway and road engineering.		
625 .1. Way and works.		
The new Bologna-Florence « Direttissima line »	May.	557
Kommentar zur Eisenbahnbau und Betriebsordnung vom 17. Juli 1928 (*Commentary on the Rules for the construction and operation of railways).* — 4th edition, revised and enlarged, by F. BESSER. (*New book.*)	July.	885

	Month.	Page.
625 .11. Scheme for a railway. Surveying.		
625 .113. Longitudinal section. Gradients. Curves.		
The angles diagram method applied to repegging existing curves and to new lines with long transition curves, by Dr. Ing. G. SCHRAMM	February.	222
625 .14. Permanent way.		
625 .14 (01. General matters. Calculation of stresses, etc.		
Fast running without derailment, by Dr. Ing. BÄSELER	November.	1378
625 .143. Rails and their fastenings.		
625 .143.3 Rail wear and breakages.		
Rails broken and damaged in service. Present state of the question and improvements required, by J. MERKLEN and E. VALLOT	March.	305
625 .143.4. Rail joints. Fishplates.		
Die Entwicklung der Schienenstosschweissung und das Studium der geschweissten Schienenstossverbindungen (*The development of rail joint welding and the study of welded joints*), by D. CSILLERY. (*New book.*)	September.	1200
625 .16. Equipment of minor importance. Fences. Approach roads. Level crossings, etc.		
625 .162. Level crossings.		
Street crossing protection on the Northern Pacific	November.	1385
625 .2. Railway rolling stock.		
Rolling stock improvements made by the French Main-Line Railways since the war	January.	77
625 .2 (01. General description and characteristics.		
The hunting of railway vehicles, by C. LAFFITTE-MARTINEZ	April.	443
625 .21. Principal parts of the vehicle.		
625 .213. Suspension. Springs.		
The suspension of high-speed self-driven and electric railcars, by Ad. M. HUG	October.	1275
625 .214. Axle boxes and axle guards. Lubricants.		
High-pressure lubrication for journal bearings, by G. WELTER	November.	1375
625 .215. Bogies and bissel trucks. Radial and convergent axles.		
Das Bogenläufige Eisenbahnfahrzeug (*The railway vehicle and its ability to negotiate curves*), by Roman LIECHTY. (*New book.*)	June.	763
The mechanics of a locomotive on curved track, by S. R. M. PORTER. (*New book.*)	October.	1293
Fast running without derailment, by Dr.-Ing. BÄSELER	November.	1378
625 .23. Passenger coaches.		
625 .232. Corridor carriages, sleeping cars, dining cars, etc.		
Welded coach construction on the Chicago, Milwaukee, St. Paul and Pacific Railroad	April.	473

	Month.	Page.
New first-class electric restaurant cars for the London and North Eastern Railway Company	May.	601
The « Silver Jubilee » train, London & North Eastern Railway, by O. BULLEID.	November.	1299
625 24. Goods wagons.		
625 .242. High-sided (open) wagons.		
Welded coal wagons for the London & North Eastern Railway Company	July.	879
625 .245. Special wagons.		
Welded steel hopper wagons	May.	604
625 .248. Cleaning and disinfecting wagons.		
Die Technik und Wirtschaft der Hygiene im Tierversand bei der Deutschen Reichsbahn (*The technique and economics of hygiene in transporting animals on the German State Railways*), by Dr.-Ing. Kurth WALTER. (*New book.*)	April.	476
625 .26. Carriage and wagon repair shops.		
Austrian Federal Railways Workshops Department reorganisation and development, by F. STRAUSS	January.	112
Statistics and the economical working of railways. An investigation into the maintenance of rolling stock, by Dr. Fr. LANDSBERG	November.	1332
651. Office equipment and methods.		
Neuzeitliche Organisation im Eisenbahngüterverkehr. Abrechnung — Kontrolle — Statistik (*Up-to-date organisation in railway goods traffic. Accountancy — Control — Statistics*), by P. RIEDEL. (*New book.*)	July.	882
656. Transport by road, rail, etc.		
Competition by roads, waterways and airways:		
Spain, British India, French Indo-China and French West Africa	January.	1
Czechoslovakia and Algeria	February.	135
France, Argentina, British India, French Indo-China and Portugal (Mozambique Colony)	March.	267
Germany	April.	357
Great Britain	May.	481
France, Italy, Algeria, British India, French Indo-China	June.	609
France, French Indo-China	July.	765
France and Africa (Kenya and Uganda)	November.	1326
The world crisis and railways: Effects of the crisis on railway working and measures taken to lessen these effects, etc. (Investigation into questions of immediate interest. — Question II.)		
First report covering secondary railways in Countries of Southern Europe and their Colonies, by Messrs. E. LAVALLE and E. MELLINI	April.	365
Second report, covering main-line railways, except those affiliated to the International Railway Union (U. I. C.), by Mr. Ashton DAVIES	July.	771
Second report, covering secondary railways in countries of Southern Europe and their Colonies, by E. LAVALLE and E. MELLINI	»	791

	Month.	Page.
Second report (Main-line railways in countries affiliated to the International Railway Union — U. I. C.), by Dr. COTTIER and Herr von BECK .	September.	1105
Special report, by Herr von BECK	»	1147
Summary of sectional discussion of above question (Enlarged meeting of the Permanent Commission of the International Railway Congress Association, 4-6 July 1935)	»	1158
Final summaries adopted (Plenary meeting, 6 July 1935)	»	1176
A comparative study of motor transport regulation, by Vladimir IBL . . .	May.	542
Die Neuordnung des Eisenbahnwesens und der Kraftwagen Wettbewerb in Frankreich (*The new railway working conditions and road motor competition in France*), by W. HAMACHER. (*New book.*)	October.	1291
656. (02. General matters.		
Verkehrseinheit und Verkehrspolitik (*Unity in Transport and Transport Policy*). — Note presented to the 4th Annual Study Conference of the German State Railway Company, by Dr.-Ing. Prof. Carl PIRATH. (*New book.*)	April.	477
656 .1. Road transport.		
Reichsautobahnen in Staat, Wirtschaft und Recht (*The State Motor Roads Company considered from the point of view of its relations with the State, and from the economic and legal standpoints*), by Dr.-Jur. Klaus LENGEMANN. (*New book.*)	April.	479
656 .2. Carriage by railway. Railway working.		
Organisation und Durchführung des Betriebsdienstes und Verkehrsdienstes bei der Deutschen Reichsbahn (*Organisation and working of the German State Railways*), by Dr.-Ing. LEIBBRAND and Dr.-Jur. H. DOMSCH. (*New book.*) .	May.	606
Kommentar zur Eisenbahnbau und Betriebsordnung vom 17. Juli 1928 (*Commentary on the Rules for the construction and operation of railways*). — 4th edition, revised and enlarged, by F. BESSER. (*New book.*)	July.	885
656 .21. Station working.		
656 .21 (01. General matters.		
Occupation diagrams to facilitate the intensive use of platform roads in passenger stations, by R. DEVOOGHT	April.	426
656 .211. Passenger station arrangements.		
Pennsylvania opens new passenger station at Newark, N. J.	November.	1353
656 .211.5. Miscellaneous station equipment.		
Ticket printing machines in use at the booking office at Brussels (Nord) Station, by A. DEPREZ	June.	729
656 .212. Goods station arrangements.		
656 .212.5. Marshalling yards.		
New marshalling yard near Basle, Swiss Federal Railways	April.	469
656 .213. Special stations (coal, livestock, etc.).		
Die Technik und Wirtschaft der Hygiene im Tierversand bei der Deutschen Reichsbahn (*The technique and economics of hygiene in transporting animals on the German State Railways*), by Dr.-Ing. Kurt WALTER. (*New book.*) .	April.	476

	Month.	Page.
656 .22. Trains.		
656 .222. Train working.		
656 .222.1. Speed and weight.		
1. High-speed possibilities with steam locomotives (100 m. p .h. reached on the London and North Eastern Railway)	January.	125
Note on train speeds, by Lionel WIENER. — Part II (*continued*). — Train speeds and services in different countries:		
IV. Belgium	February.	141
V. Holland	March.	275
VI. Italy	April.	385
VII. Austria / VIII. Hungary	May.	493
IX. Switzerland	July.	817
	October.	1201
656 .222.4. Capacity of lines and train working.		
Increasing the capacity of a suburban railway, by Ad. M. HUG	March.	345
656 .225. Goods services. Grouping of consignments, etc.		
Co-ordinated fast-freight handling system developed	May.	597
The « Container », Bulletin of the International Container Bureau, published under the auspices of the INTERNATIONAL CHAMBER OF COMMERCE. (*Review.*)	June.	764
656 .23. Traffic and rates.		
656 .235. Rates and conditions for carrying goods.		
El Problema de las detasas. Las reclamaciones por excesos de portes y las juntas de detasas (*The problem of rate reductions. Claims against high rates, and the Rates Committees*), by E. d'OCON CORTES. (*New book.*)	July.	883
656 .237. Accounts and auditing of railway earnings and expenditure.		
Neuzeitliche Organisation im Eisenbahngüterverkehr. Abrechnung — Kontrolle — Statistik (*Up-to-date organisation in railway goods traffic. Accountancy — Control — Statistics*), by P. RIEDEL. (*New book.*)	July.	882
656 .24. Claims.		
El Problema de las detasas. Las reclamaciones por excesos de portes y las juntas de detasas (*The problem of rate reductions. Claims against high rates, and the Rates Committees*), by E. d'OCON CORTES. (*New book.*)	July.	883
656 .25. Safety precautions. Signals.		
656 .254. Apparatus for communicating information at long distances. Alarm bells and special warning devices. Telegraph. Telephone. Communication between stations and trains in motion. Various systems of working. Train dispatchers. Covering break-downs.		
Automatic train control on the German State Railways. Extensive installations of the inductive system	March.	339
Apparatus for repeating and recording signal indications in locomotive cabs and railcar driving compartments, by A. MASCINI and G. MINUCCIANI	December.	1399
656 .255. Single-line working. Centralized traffic control on single lines.		
Centralized traffic control installed on the Alton Railroad	March.	335

	Month.	Page
656 .256. Block system.		
Ground detector for A. C. circuits on electrified lines	May.	592
Automatic interlocking on the Brooklyn-Manhattan Transit, by A. A. ROBERTS.	June.	752
656 .256.3. Automatic block.		
American Railway Signaling Principles and Practices. — Chapter XV: Automatic block systems, by the ASSOCIATION OF AMERICAN RAILROADS, SIGNAL SECTION. (*New book.*)	July.	881
Automatic block with light signals, installed between Caen and Cherbourg, by C. CHOUQUET	October.	1286
656 .258. Indirect interlocking. Interlocking plant.		
Automatic interlocking on the Brooklyn-Manhattan Transit, by A. A. ROBERTS.	June.	752
656 .259. Other safety appliances.		
Street crossing protection on the Northern Pacific	November.	1385
656 .26. Ancilliary services.		
656 .261. Cartage. Collection and delivery.		
Co-ordinated fast-freight handling system developed	May.	597
66. Chemical technology.		
662. Fuels, explosives, etc.		
Diesel fuels and their selection, by H. N. BASSETT	December.	1448
665 .882. Autogenous welding.		
Experimental determination of the shrinkage stresses in butt-welded joints, by Dr.-Ing. G. BIERETT	September.	1185
669. Metallurgy and assaying.		
Stress distribution in aluminium connecting rods, by R. L. TEMPLIN	October.	1252
7. Fine arts.		
72. Architecture.		
725. Public buildings.		
725 .3. Transport and storage.		
725 .31. Passenger station buildings.		
Pennsylvania opens new passenger station at Newark, N. J.	November.	1353

VOL. XVII — N° 12 DECEMBER 1935

Monthly Bulletin of the International Railway Congress Association

(English Edition)

CUMULATIVE ECONOMY

Every pound saved in dead weight has a cumulative effect, and a 40 % to 50 % reduction in weight of railway brake gear means a considerable annual saving in running and maintenance costs.

For this reason

WESTINGHOUSE

STEEL BRAKE CYLINDERS

both air and vacuum, are being used in increasing numbers all over the world.

Made in all standard sizes, by

WESTINGHOUSE BRAKE & SIGNAL CO. LTD.

82, YORK ROAD, KING'S CROSS, LONDON N.1.

In Australia : The Westinghouse Brake Co. of Australasia Ltd., CONCORD WEST, N.S.W.
In India : Saxby & Farmer (India) Ltd, CALCUTTA and BOMBAY.

OVER SIX YEARS SERVICE

WITHOUT
REPLACEMENTS
OR MAINTENANCE

AND PROBABLY GOOD FOR
ANOTHER SIX- AND SIX
MORE AFTER THAT

The picture shows one of the two 6 kW. metal rectifiers installed six years ago at Manchester, L.M.S. Rly., from which all the D. C. point machines have since been operated entirely.

Could any other type of rectifier give such reliable and economical service? Because they are so dependable, the use of

WESTINGHOUSE

METAL RECTIFIERS

is increasing rapidly in Railway Service, and other important services where reliability is essential.

MADE IN ENGLAND BY

WESTINGHOUSE BRAKE & SIGNAL Co. Ltd., 82, York Road, London N.1.

"An order of more than usual interest"

« Railway Gazette », July 12th.

A special diesel locomotive of 150-165 b.h.p. has been built recently by The Hunslet Engine Co. Ltd., for the Sinai Mining Co. Ltd. « This locomotive has to haul a trailing load of 225 tons up a grade of 1 in 65, and on return journey 58 tons of empties up a grade of 1 in 22 having a curve of 100 foot radius. »

To negotiate such grades and curves with ease and safety, the very best braking equipment is necessary, and therefore.

WESTINGHOUSE

AIR BRAKES

were fitted. This equipment includes the latest type of self-lapping brake valve which ensures sensitive and instantaneous operation and graduation of the brakes, both in application and release.

MADE IN ENGLAND BY

WESTINGHOUSE BRAKE & SIGNAL Co. Ltd., 82, York Road, London N. 1.

MODERN SIGNALLING REQUIREMENTS

Seven Row Locking Frame in Maastricht (Holland)

Four Row Locking Frame in Dortmund (German State Railway)

Mechanical and Electrical Interlocking Frames, Multiple Row Power Frames

Automatic and Hand-worked Block-Signalling

Automatic Gravity-Yard Power-Frames, Rail-Brakes

Automatic Level Crossing Signals

Automatic Train Control (Mechanical and Inductive Type)

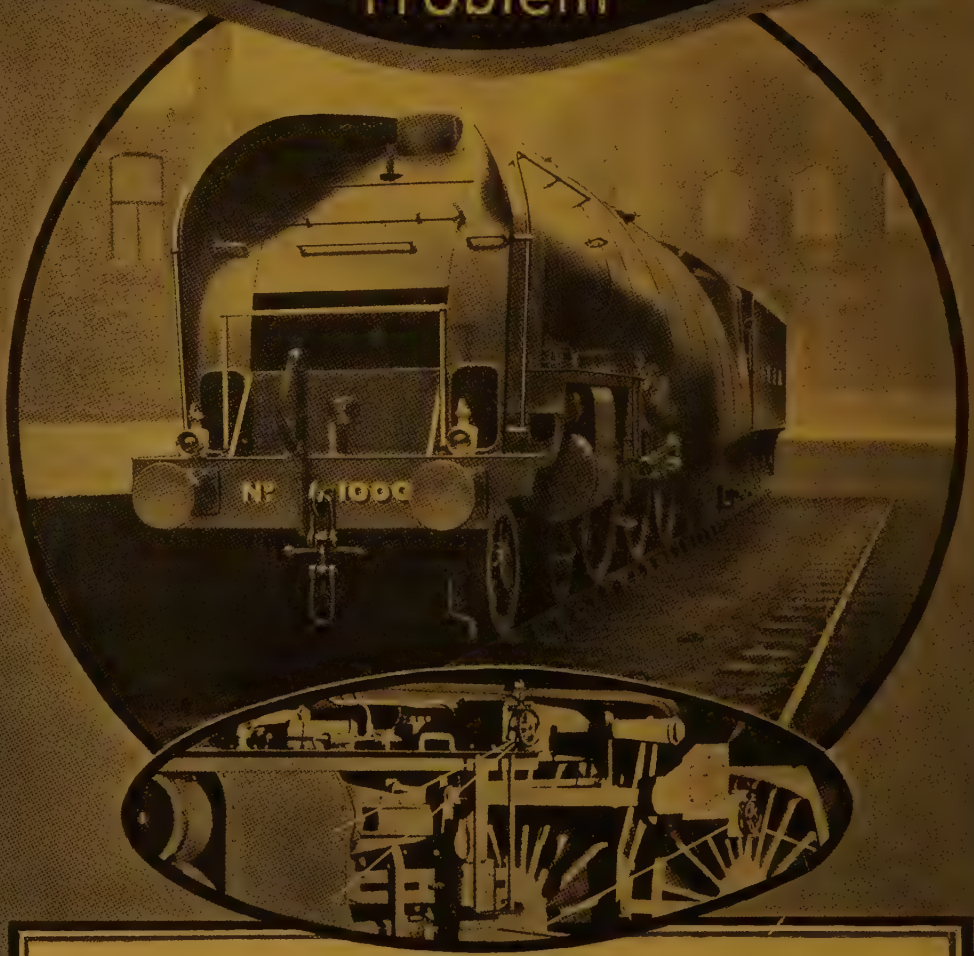
VEREINIGTE EISENBAHN-SIGNALWERKE

G. M. B. H.

BERLIN-SIEMENSSTADT

Works in Berlin-Siemensstadt, Braunschweig, Bruchsal, Georgsmarienhütte

High Pressure Steam
-and the Lubrication Problem



THE L.N.E.R. 4- CYLINDER COMPOUND EXPRESS LOCOMOTIVE depicted above, fitted with high pressure Yarrow-Gresley boiler, is equipped with WAKEFIELD No 7 pattern Mechanical Lubricators for valves, cylinders and axleboxes. One of the principal and most difficult problems associated with the use of steam at very high pressures in locomotives is that of lubricating the cylinders and piston valves; whilst for heavily loaded bearings forced lubrication has become a necessity. WAKEFIELD'S Mechanical Lubricators adequately meet both requirements.

C. C. WAKEFIELD & CO., LTD.

WAKEFIELD HOUSE, 30-32, CHEAPSIDE, LONDON, E. C. 2

'ENGLISH ELECTRIC'

DIESEL-ELECTRIC LOCOMOTIVES *for* SHUNTING PURPOSES

Orders for these locomotives have recently been placed by :

G.W. RAILWAY (GREAT BRITAIN)

L.M.S. RAILWAY (GREAT BRITAIN)

SOUTH AFRICA
NEW CONSOLIDATED GOLDFIELDS

SUDAN
GOVERNMENT RAILWAYS

In each case, the Diesel Engines, Generators, Motors and Control Equipment will be supplied by the "English Electric" Co. and the mechanical structure by **Messrs. Hawthorn, Leslie & Co., Ltd.**

BRANCH OFFICES AND ASSOCIATES ABROAD :

ARGENTINA, AUSTRALIA, BRAZIL, CANADA, CEYLON, CHILE, CHINA, DENMARK, EGYPT, ICELAND, INDIA, JAPAN, MALAYA, NEW ZEALAND, SOUTH AFRICA.

RAILWAY ELECTRIFICATION IN BRAZIL

MAIN LINE AND SUBURBAN

Rio de Janeiro
to
Barra do Pirahy
and
Santa Cruz

3000 Volts D.C.

The mark of efficiency

This comprehensive scheme of railway electrification covers 147 Km. of system on the Central Railway of Brazil.

The contract comprises the entire Power Distribution and Track Equipment and includes—

78 Motor-coach train Units
(each of one motor coach and two driving trailer coaches).
9 Passenger Locomotives of 2862 H.P.
15 Freight Locomotives of 1580 H.P.
6 Small Locomotives of 700 H.P.

METROPOLITAN Vickers ELECTRICAL CO., LTD.
TRAFFORD PARK ··· MANCHESTER 17.

XK/A32

LUX
rosette positive plates

ROBUST AFTER 10 YEARS OF STRENUOUS SERVICE

Here's an unretouched photo of a group of Lux rosette positive plates after 10 years' service. They are perfectly healthy and are fit for many more years' service. The rosette positive plate is the secret of the long life of Lux Batteries. Unlike ordinary plates it has no paste to shed, and it cannot "grow" or buckle.

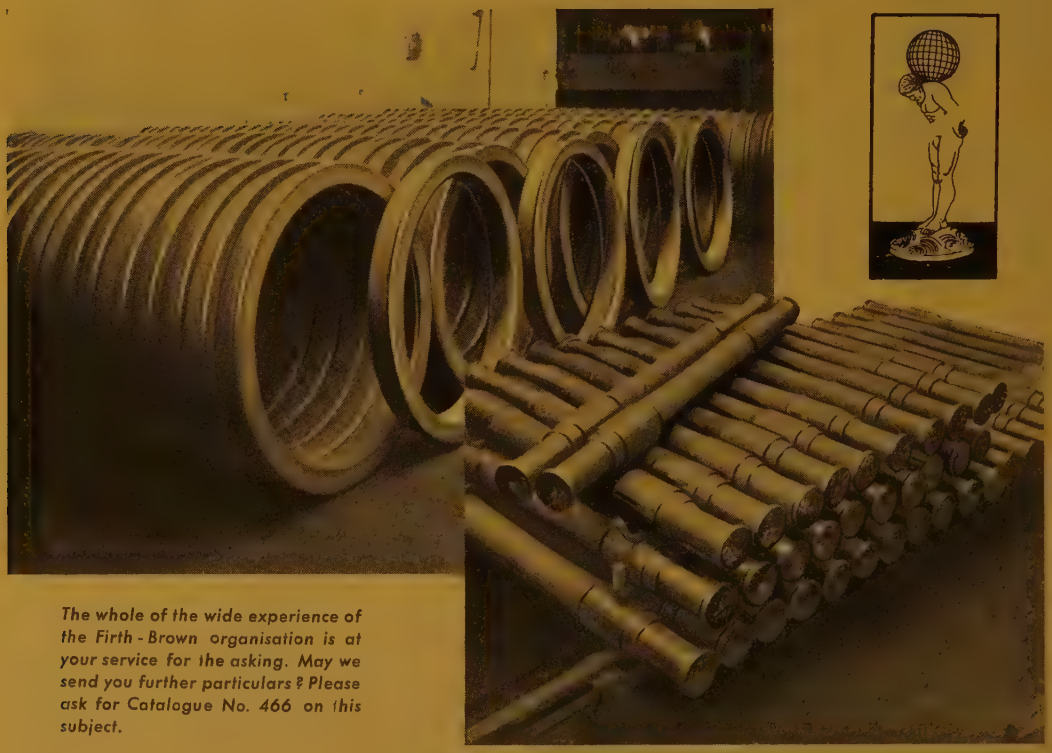
Lux

TRAIN LIGHTING BATTERIES

✱ *Chloride Battery Service extends all over the world.*

THE CHLORIDE ELECTRICAL STORAGE CO. LTD., Exide Works, Clifton Junction, near Manchester. *Export Sales Office:* 137 Victoria Street, London, S.W.1. Branches at Bombay, Calcutta, Capetown, Singapore, Sydney, Christchurch (N.Z.), Copenhagen, etc.

FIRTH - BROWN TYRES & AXLES



The whole of the wide experience of the Firth - Brown organisation is at your service for the asking. May we send you further particulars? Please ask for Catalogue No. 466 on this subject.

There is but little doubt that the secret of long history of success of Brown's and Firth's Railway Tyres and Axles is due to a combination of unique resources harnessed for their production. Even those who have given more than a passing thought to this patent truth, cannot but be struck by the unusual marshalling of competent supervision and painstaking workmanship.

True it is that modern machinery plays its important part, but metallurgical research facilities second to none, steelmaking resources and immense experience, play an even greater part in producing tyres and axles so good that their betters will probably result from a supreme effort on the part of the same Firth-Brown organisation.

THOS FIRTH & JOHN BROWN LTD SHEFFIELD

VICKERS "V.I."

SINGLE BATTERY SYSTEM for ELECTRIC LIGHTING OF TRAINS.

THE DOES THE WORK

AND THE CONTROLS THE LIGHT

CALL AND SEE IT IN OPERATION IN OUR SHOWROOM

VICKERS TRAIN LIGHTING Co LTD

(Proprietors: VICKERS LIMITED)

VICKERS HOUSE, BROADWAY, LONDON, S.W.1.

Telegrams: VICTRALITE, SOWEST, LONDON. Cablegrams: VICTRALITE LONDON Telephone: VICTORIA 6900

Soc. An. LA BRUGEOISE et NICAISE & DELCUVE

Works at SAINT-MICHEL
near BRUGES and at
LA LOUVIERE (Belgium)

210-HP Diesel-Maybach Rail Motor Car
for the Belgian Railways

ROLLING STOCK
and FIXED EQUIPMENT
for Railways and Tramways

RAIL MOTOR CARS

ALL-METAL CARRIAGES — SLEEPING CARS — RESTAURANT CARS
SELF-DISCHARGING HIGH-CAPACITY WAGONS — TANK WAGONS — TENDERS

Bridges — Frames — Tanks — Gasometers

SIEMENS MARTIN STEEL WORKS

WHEEL SETS — TYRES — AXLES — STEEL CASTINGS — SPRINGS

Railway Materials

THE UNITED STEEL COMPANIES LTD

SAVE WEIGHT WITH THESE TWO ALLOY STEELS

THE TABLE BELOW SHOWS THE SAVING IN WEIGHT ON RAILWAY CONNECTING RODS MADE FROM "TORMANC SPECIAL" & "TORMOL" ALLOY STEELS"

STEEL.	TENSILE TONS SQ. IN.	RELATIVE WEIGHTS.
BSS 8, CLASS C.	32/38	100%
"TORMANC SPECIAL"	40/45	81%
"TORMOL"	55/65	68%

The reduction in weight by the use of these steels for reciprocating parts such as coupling and connecting rods simplifies the problem of balancing.

"TORMANC SPECIAL" A low carbon manganese molybdenum steel which, compared with B.S.S. 8, Class "C," gives very much superior tensile strength, yield point and impact value without serious loss of ductility. Is simple to heat-treat and free from temper brittleness.

"TORMOL" A nickel-chrome-molybdenum steel unequalled for highly stressed parts, especially where it is desired to save reciprocating weight. Resistant to shock and fatigue and free from temper brittleness. Simple in heat treatment and, therefore, very satisfactory for larger forgings.

SAMUEL FOX & CO. LTD.

Associated with The United Steel Companies Limited

STOCKSBRIDGE SHEFFIELD

John Cockerill & Cº

SERAING
(Belgium)

Railway crossing of manganese steel

Mines, Iron & Steel Works
Engineering, Shipbuilding
Artillery, Cement

SOLID

FORGED AND ROLLED STEEL

WHEELS

TYRES, AXLES & DISC CENTRES

FOR
LOCOMOTIVES
CARRIAGES & WAGONS

TAYLOR BROS
& COMPANY LIMITED
TRAFFORD PARK STEEL WORKS, MANCHESTER.

London Office:
VICKERS HOUSE, BROADWAY,
WESTMINSTER, ——— S.W. 1.

MODERN TRAFFIC
REQUIRES
MODERN TRACK

•

PERFECT SECURITY
for heavy traffic
and high speeds

•

no bolts · no loosening
no up-keep
an always accurate gauge

THE STEEL SLEEPER
SALES MONOPOLY: SOCIÉTÉ COMMERCIALE D'OUGRÉE AT OUGRÉE
OUGRÉE-MARIHAYE PATENT

OW AN ESTABLISHED FEATURE IN MODERN RAIL OPERATION

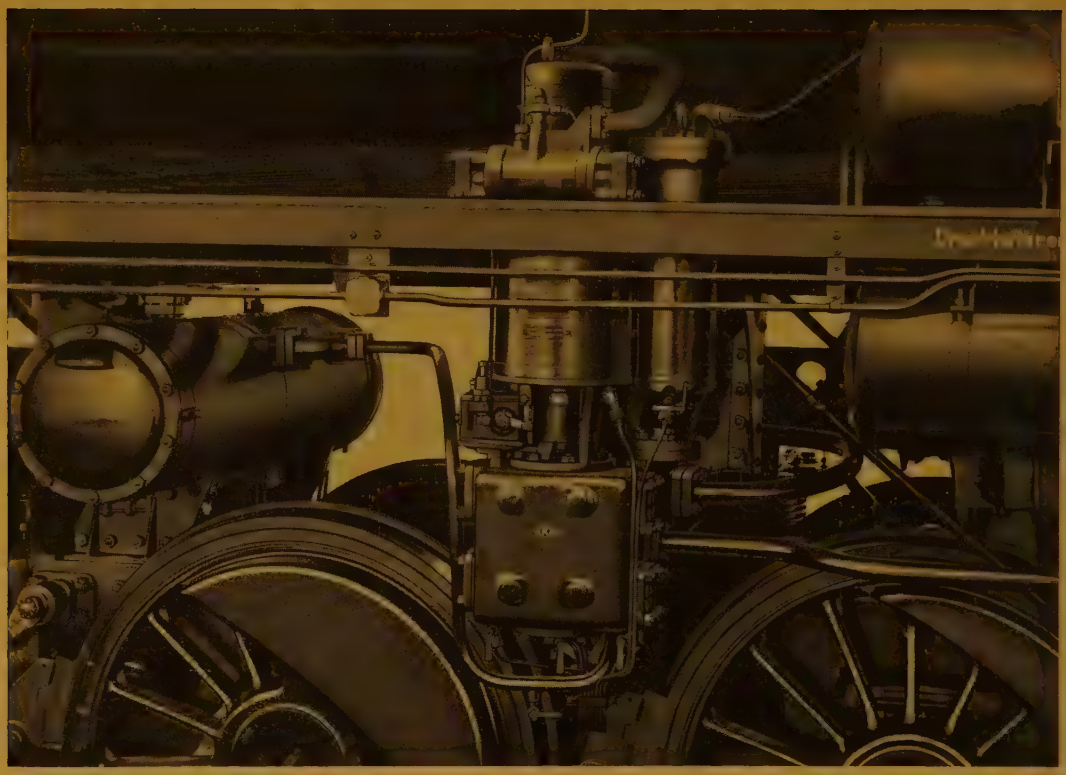
AEC
SOUTHALL

OIL ENGINED RAILCARS

Operated by the G.W.R. for local and long distance express services these streamlined units have helped to solve many rail traffic problems. Literature will be gladly forwarded on request.

THE ASSOCIATED EQUIPMENT CO. LTD., SOUTHALL, MIDX.

BUILDERS OF LONDON'S BUSES AND TROLLEY BUSES



Knorr Preheater Plants

utilise the exhaust steam of the locomotive to heat the feed water up to 212°F. and ensure reliable and continuous boiler feeding. By the heat so recuperated they allow great savings of coal or increase of engine power. The expenditure for preheater plants is reclaimed within one year. Greatest safety in service, minor costs in maintenance, ease of handling.

Knorr Feed Water Pumps

are high-speed compound piston pumps without fly-wheel and operate independent of the engine throttle, temperature of the water in the tender tank, boiler working pressure and exhaust steam pressure. The delivery can be regulated to a nicety over the whole range from zero to maximum. Smooth and noiseless working of pump secured by patented Tolkien control gear, simple in design. Pulsation is kept away from the delivery pipe, boiler feed valve and preheater by a patented float shock-absorber.

Knorr Surface Preheaters

enclose in a well insulatet jacket a removable nest of tubes which ensure perfect transfer of heat from the exhaust steam to the feed water. The tubes are free to expand under the influence of the heat. No formation of scale owing to the high turbulence of water. The float prevents oxygen from the air beeing carried off by feed water, thus avoiding corrosion of the tubular elements.

KNORR-BREMSE
A-G **BERLIN O 112**

Bulletin of the International Railway Congress Association

N. B. — This contents sheet is appended to the BULLETIN to be cut out, pasted on slips and used for the catalogues.

CONTENTS OF THE NUMBER FOR DECEMBER 1935.

1935 656 .254
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1399.
MASCINI (A.) and MINUCCIANI (G.). — **Apparatus for repeating and recording signal indications in locomotive cabs and railcar driving compartments.** (15 000 words & fig.)

1935 621 .132.3 (.43) & 621 .132.8 (.43)
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1437.
New German **streamlined 4-6-4 type locomotives.** (2 000 words & fig.)

1935 621 .43 & 662
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1448.
BASSETT (H. N.). — **Diesel fuels and their selection.** (3 500 words & fig.)

1935 313 : 625 .143.3
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1455.
Statistics of rail breakages for the years 1933 and 1934. Part I. (Tables.)

1935 621 .335
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1487.
Present tendencies in **electric locomotive construction.** (1 700 words.)

1935 621 .133.1 (.436)
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1489.
STRAUSS (F.). — **Fuel consumption** on Austrian Railways. Recent technical **improvements.** (1 700 words & fig.)

1935 621 .133.7 (.42)
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1492.
Water-softering plant on the London & North Eastern Railway. New installations. (700 words & fig.)

1935 621 .13 (02 & 621 .137 (02
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1494.
NEW BOOKS AND PUBLICATIONS : **Leitfaden für den Dampflokomotivdienst** (*Manual for the steam locomotive staff*), by L. NIEDERSTRASSER. (500 words.)

1935 385. (09.2
Bull. of the Int. Ry. Congress Ass^on, No. 12, Dec., p. 1495.
OBITUARY : Georges **Philippe.** (400 words.)

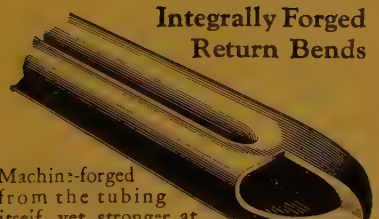
Alphabetical Index of Advertisers

Firms:		Specialities:
Albion Motor Car Co.	—	Commercial and public service motor vehicles.
Anglo-Franco-Belge, S. A.	XXIII	Locomotives and Railway rolling stock.
Anti-Attrition Metal Co. (The)	—	Bronzes and white bronzes for railway purposes.
Armstrong Oiler Co., Ltd. (The)	XXVII	Lubricators.
Associated Equipment Co., Ltd. (The)	XVI	Passenger and commercial motor vehicles.
Ateliers de Constructions Electriques de Charleroi	XXI	Electric train lighting. Electric signalling.
Ateliers de Construction de la Meuse	—	Locomotives.
Ateliers Métallurgiques	—	Locomotives, Railway and Tramway rolling stock.
Auxiliaire des Chemins de fer et de l'Industrie	—	Preheaters, Purifiers, De-areators.
Baume et Marpent	—	Railway and Tramway rolling stock.
Bayliss, Jones & Bayliss, Ltd.	—	Railway fastenings, rail screws, etc.
Beardmore & Co., Ltd. (Wm.)	—	Diesel motor coaches, etc.
Boby, William & Co., Ltd.	—	Water Softeners for Railways.
Bonnel (1924), Ltd. (W. A.)	—	Cemented waterproof. Sleepers, crossings, etc.
Brugeoise et Nicaise & Delcuve (La)	XI	Railway rolling stock and fixed equipment.
Chloride Electrical Storage Co., Ltd. (The)	VIII	Train lighting batteries.
Cockerill & Co. (John)	XIII	Iron and steel in all forms.
Coltness Iron Co., Ltd.	XXI	Locomotive Steel Castings.
Colvilles, Ltd.	—	Boiler plates.
Davies & Metcalfe, Ltd.	—	Injectors, ejectors, etc.
Demag A. G.	—	Special Cranes and Lifting Appliances.
Docker Brothers	XXVII	Varnishes, Japans, Fine colours, etc.
Dunlop Rubber Co., Ltd.	—	Rubber springs, Buffers, Hosepipes.
English Electric Company, Ltd. (The)	VI	Railway electrification.
English Steel Corporation, Ltd.	—	Alloy steels.
Firth (Thos) & Brown (John), Ltd.	IX	Hollow forgings. Tyres, axles, etc.
Gilmour Smith & Co., Ltd.	—	Asbestos, Beltings, Fasteners, etc...
Gresham & Craven, Ltd.	—	Ejectors, injectors, lubricators, etc.
Guest, Keen & Nettlefolds, Ltd.	XXII	Screws.
Haine-St-Pierre (Forges, Usines et Fonderies de)	—	Railway rolling stock.
Herbert, Ltd. (Alfred)	—	Makers of machine tools.
Hoffmann Mfg. Co., Ltd. (The)	XXIV	Bearings.
Kaye & Sons, Ltd. (Joseph)	XXIII	Seamless steel oil feeders.
Kearns & Co., Ltd. (H. W.)	—	Borers.
Knorr-Bremse, A. G.	XVII	Air brakes, feedwater heaters, etc.
Lightalloys, Ltd.	—	Aluminium alloys in all forms.
London & North Eastern Ry.	—	Public Transport.
Maschinenfabrik Augsburg-Nürnberg A.G.	—	Diesel and Electric Railcars.
Metropolitan Cammel Carriage Wagon & Finance Co., Ltd.	—	Rolling stock of all kinds.
Metropolitan Vickers Electrical Co., Ltd.	VII	Railway-Electrification.
Monk Bridge Iron & Steel Co., Ltd.	—	Locomotive forgings, tyres, axles, etc...
Murex Welding Processes Ltd.	—	Welding Processes.
Nobel Chemical Finishes Ltd.	XXVI	« Dulux » coach finishes.
Pritchett & Gold and E. P. S., Ltd.	XXV	Accumulators for train lighting.
Rexine, Ltd.	XXIV	Leathercloths.
Roberts (J. W.), Ltd.	—	Asbestos products in all forms.
« Sentinel » Waggon Works, Ltd. (The).	—	Locomotives. Rail cars, etc.

Firms:		Specialities:
Société Commerciale de Belgique . . .	XV	Patented steel sleepers.
Spencer (J.) & Sons, Ltd.	—	Railway springs, axle forgings, etc.
Spencer-Moulton & Co., Ltd. (George) .	XXIX	India rubber springs of all kinds.
Still & Sons, Ltd. (W. M.)	—	Kitchen and service equipment.
J. Stone & Co., Ltd.	—	Railway specialities of all kinds.
Superheater Company (The), London . .	—	Superheaters for locomotives and multiple valve regulator headers.
Superheater Company (The), New York.	XX	Steam superheaters for locomotives, marine, etc.
Talbot	—	Ballasting Wagons.
Taylor Bros & Co., Ltd.	XIV	Wheels and axles.
Turton Brothers & Matthews, Ltd. . .	XXVI	Timmis Double-Web spiral steel springs.
United Steel Companies, Ltd. (The) . .	XII	Steel sleepers, steel for all purposes.
Vacuum Brake Co., Ltd.	—	Air brakes.
Vacuum Oil Company, Ltd.	—	Lubricants for locomotives.
Vereinigte Eisenbahn-Signalwerke . . .	IV	Railway signalling.
Vereinigte Westdeutsche Waggonfabriken	—	Rolling stock.
Vickers Train Lighting Co., Ltd. . . .	X	Train lighting dynamos and equipment.
Vi-Spring Products, Ltd.	—	Seat springs.
Wakefield & Co,, Ltd.	V	Mechanical lubricators: oils for all purposes.
Ward & Ltd.	XXII	Machine Tools.
Westinghouse Brake & Signal Co., Ltd.	I, II, III	Railway signalling. Brakes. Heating systems.
Wild & Co. (A. G.)	—	Railway supplies, steam heating, etc.
Willford and Company, Ltd.	XIX	Railway springs and for all their purposes.

Serving
the SUPERHEATING REQUIREMENTS *of the* WORLD'S RAILWAYS

Integrally Forged Return Bends



Machine-forged from the tubing itself, yet stronger at the bend where strength is most needed. Provides constant area through the bend, with smooth internal and external surfaces—avoiding restriction of steam through units or accumulation of soot, ashes or cinders.

Multiple-valve Throttle-headers

A finger-type header with multiple-valve throttle or regulator contained in the casting. Without changing smokebox arrangement this throttle-header offers distinct advantages: Steam is controlled between the superheater and cylinders; superheated steam is always available for auxiliaries; use of a series of small valves opening and closing consecutively gives better and quicker control of locomotive movements.

Through a coordinated service with associated organizations in Great Britain, France, Germany, the United States, Canada, and Australia, the railways of the world are served with locomotive superheating equipment, that conforms to a general standard of practice, yet is adapted to the particular requirements of each individual country.

A distinguishing characteristic of the locomotive superheaters manufactured by these associated companies is the exclusive use of return bends, integrally forged with the tubing to form the loops of the superheater elements or units. These bends are machine-forged without utilizing either additional material or a flux. Railroads the world over have standardized on locomotive superheaters with these integrally-forged return bends. They have been applied to more than 100,000 locomotives.

These associated companies, as a result of constant development and research, and interchange of combined experience in modern railroading, offer improved superheating equipment to meet the changing conditions of locomotive operation. An outstanding recent development, now being adopted rapidly for every class of locomotive service, is the multiple-valve throttle-header.

THE SUPERHEATER COMPANY
60 East 42nd Street, New York, N. Y., U. S. A.

ASSOCIATED COMPANIES:

The Superheater Company, Limited
Dominion Square Bldg., Montreal, CANADA

The Superheater Company Limited
Bush House, Aldwych, London, W.C. 2, ENGLAND

Compagnie des Surchauffeurs
Rue la Boëtie 3, Paris, FRANCE

Schmidt'sche Heissdampf-Gesellschaft, m. b. H.,
Rolandstrasse 2, Cassel-Wilhelmshöhe, GERMANY

The Superheater Company (Australia) Limited
Manchester Unity Building, 185 Llizabeth Street, Sydney, N. S. W.

Agencies Throughout the World

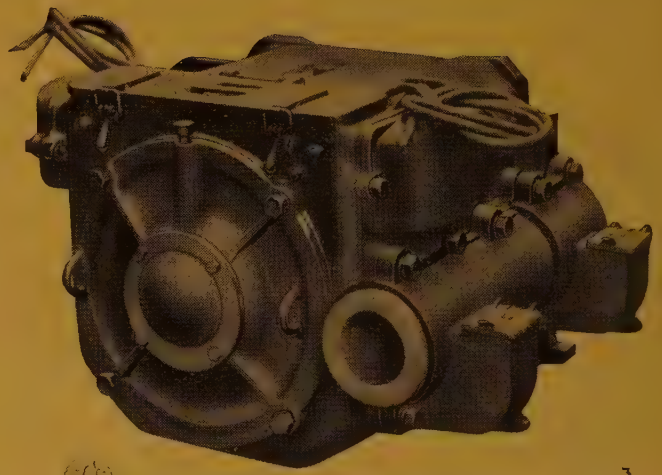
A-914

A.C.E.C.

Ateliers de Constructions Electriques de Charleroi

Electric traction plant
Motors and equipment
Electric lighting plant
for trains

Electric signalling
Wires and Cables



7011 3

Coltness Iron Company Limited

NEWMAINS, LANARKSHIRE, SCOTLAND

We specialize in
Locomotive Steel Castings

Wheel Centres, Domes, Piston Heads, Horn Blocks, Axleboxes, etc.
of which we are the largest makers in Great Britain
Steel castings up to 15 tons - Iron Castings up to 50 tons

London Office . 10 Iddesleigh House, Caxton Street, London S. W. 1.
Indian Office : Turner Hoare & Co., Gateway Bldg. Appollo Bunder, Bombay
South African Office : D. Drury & Co. Ltd., P. O. Box 3929, Johannesburg

Ward

CAPSTAN & TURRET LATHES

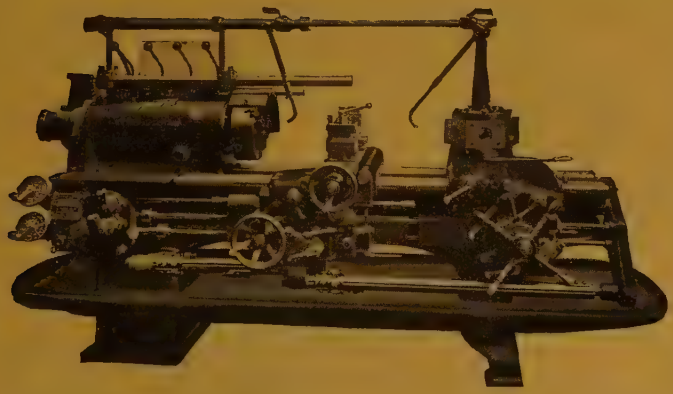


Illustration shows a No. 7 Combination Turret Lathe with Patent Covered Bed, Ball and Roller Bearing Headstock, Ground Gears, Automatic Lubrication etc.

Height of centre 8.3/4".
Swing over Bed Covers 16"
Diameter of hole through spindle 2.5/8"
Range of spindle speeds 26-1000 R.P.M.

CATALOGUES ON REQUEST

H. W. WARD & Co., Ltd DALE ROAD SELLY OAK BIRMINGHAM

NETTLEFOLDS SCREWS

Standard quality all over the world

TRADE MARK

GUEST, KEEN & NETTLEFOLDS, LIMITED,
BIRMINGHAM -- ENGLAND

Sté ANGLO-FRANCO-BELGE

DE MATÉRIEL DE CHEMINS DE FER

LA CROYÈRE **BELGIUM**

Telegrams : LOCOMORAM-LA CROYÈRE Telephone. 2 lines : LA LOUVIÈRE Nos. 44 and 1229

Carriages of every class and description. — Rail motor cars, Steam, electric, heavy-oil petrol and gazolene locomotives. — Ordinary and special waggons. — Caboose Cars and brake vans. — Tenders. — Crossings, switches and track material. — Boiler and plate work. — Heavy forgings.

Kaye's patent automatic railway carriage door wedge locks and all other types of door and cabinet locks as adopted by most of the English and Colonial railways. Also K's patent seamless steel oil feeders torch lamps, etc.

JOSEPH KAYE & SONS LTD.

Lock Works, Leeds 10 & 93, High Holborn, London W.C.1.

Established 1864

This twin Diesel Railcar designed and made by Messrs. WALKER BROS. (Wigan) Ltd., uses

HOFFMANN ROLLER BEARING AXLE BOXES

on the **Carrying Bogies.**

HOFFMANN BEARINGS

are largely used on the POWER PLANT :

throughout to the 2 GARDNER « 6.L.W. » engines, exclusively to the MEADOWS type « 10 » 4-speed gear box, and extensively to the DAVID BROWN worm drive.

THE HOFFMANN
Mfg. Co. Ltd., Chelmsford, Essex

"Rexine" BRAND

fabric cloth was used for covering the whole of the exterior panelling of the

L.N.E.R. 'SILVER JUBILEE' TRAIN

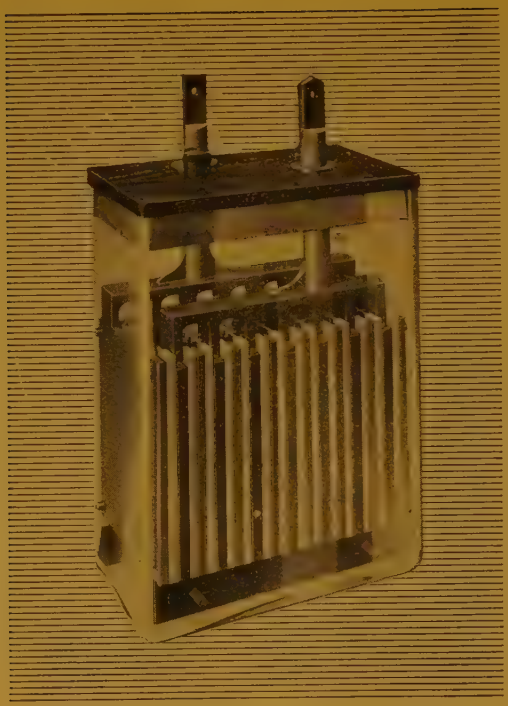
and for the whole of the interior decoration of the 1st & 3rd class compartments.

Write for patterns and full particulars.

I.C.I. (REXINE) LIMITED, HYDE, CHESHIRE

I.C.I. (Rexine) Ltd. is a subsidiary company of Imperial Chemical Industries Ltd.

London Office: 60 Wilson Street, Finsbury, E.C.2



Always Reliable under any conditions

P.&G. AND E.P.S. CELLS

FOR TRAIN LIGHTING

PRITCHETT & GOLD AND E.P.S. CO., LTD.

50, GROSVENOR GARDENS, LONDON, S.W.1

'Phone: Sloane 7164. 'Grams: Storage, Sowest, London

Works: Dagenham Dock, Essex

P.R.10.

FOR ALL

Advertising

in this Bulletin apply to the

International Railway Congress Association

Brussels, 74, rue du Progrès

TURTON BROTHERS & MATTHEWS, LIMITED.

SHEFFIELD

TRADE MARK

PILOT

SOLE-MAKERS OF THE

TIMMIS' DOUBLE - WEB

High-class steel springs for all purposes

The « PILOT BRAND » springs are made only of the highest quality of material. The greatest skill is used in their manufacture. They are finished with the greatest accuracy. They are made in SHEFFIELD.

They will outlast any other springs as has been proved by over 50 years of experience.

Instances have been brought to our notice of springs being in service for over 30 years, and even then some were unbroken.

These springs are, therefore, suitable for Railway Rolling Stock where a very high standard is insisted on. They are especially suitable for Carriage Bolster Bearing Springs where ease and steadiness in running as well as reliability are essential.

They are in use on the LONDON & NORTH EASTERN RAILWAY, LONDON MIDLAND & SCOTTISH RAILWAY and SOUTHERN RAILWAY and many other Railways.

The famous Silver Jubilee Train of the L. & N. E. R. is fitted throughout with these springs.

"DULUX"

TRADE MARK

'Dulux' Coach Finishes dry rapidly with a hard and beautifully glossy surface. They last longer than any other coach finish, reduce re-painting costs and can be cleaned without detriment to the surface.

Write for full particulars and colour cards to—

NOBEL CHEMICAL FINISHES LTD.

(Associated with Imperial Chemical Industries Ltd.)

Nobel House, Buckingham Gate, London, S.W.1.

FOR **50** YEARS
SPECIALISTS IN THE MANUFACTURE OF PAINTING MATERIALS
FOR RAILWAY WORK

FOR THE MECHANICAL ENGINEERS' DEPARTMENT

SYNTHOLUX Synthetic Finish. MATURED VARNISHES. PAINTS & ENAMELS. HERCULENE Paint Remover. PRIMO SURFACER Rust Remover, INDUROLEUM Fire-proof Flooring.

FOR THE ENGINEERS' DEPARTMENT

HERMATOR Anti-corrosive Paints. TANKOID Aluminium Paint. PERMANENT SIGNAL RED SYNTHOLUX. PRIMO SURFACER Rust Remover. INDUROLEUM Fire-proof Flooring.

FOR THE TRAFFIC DEPARTMENT

VITAPOL for cleaning painted surfaces. WINDOW CLEANING SOLUTION. Special CARRIAGE WASHING Soap.

DOCKER BROTHERS

LADYWOOD BIRMINGHAM, 16 and 4 & 6, MOOR LANE, LONDON, E. C. 2

Telegraphic Address : OILER, YORK Code used : ABC 5th Edition Telephone : 2946

THE ARMSTRONG OILER Co, Ltd. YORK

Patentees and manufacturers of **The « ARMSTRONG » Oiler**

For lubricating
All Types of Railway and Tramway Journals
Efficient and Perfect in Every Detail

WATER PROOF
OIL PROOF
DUST PROOF
FOOL PROOF

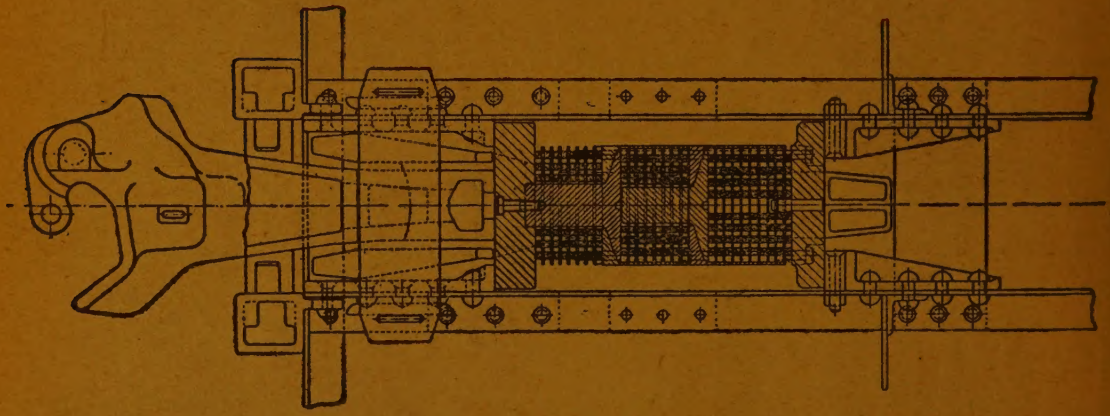
« ARMSTRONG OILER » fitted with Oil Seal for tip Wagon Axle Boxes

SAMPLE SETS FOR TRIAL SUPPLIED FREE OF CHARGE

SPENCER-MOULTON

PATENT

DRAFT GEAR



AS SUPPLIED FOR

South African Railways

GEO. SPENCER MOULTON & CO. LTD., 2, CENTRAL BUILDINGS, LONDON, S.W 1

M. WEISSENBRUCH
S. A. -- BRUXELLES